

Commonwealth of Pennsylvania.

DEPARTMENT OF AGRICULTURE

BULLETIN No. 210

PROCEEDINGS OF THE
THIRTY-FOURTH ANNUAL MEETING

OF THE

Pennsylvania
State Board of Agriculture



HELD IN THE

BOARD OF TRADE BUILDING, HARRISBURG, PA.

January 24, 25 and 26, 1911

HARRISBURG:

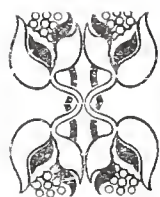
C. E. AUGHINBAUGH, PRINTER TO THE STATE OF PENNSYLVANIA

1911



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MEMBERS

OF THE

PENNSYLVANIA

STATE BOARD OF AGRICULTURE

FOR THE YEAR 1911

MEMBERS EX-OFFICIO

HON. JOHN K. TENER, Governor.
HON. HENRY HOUCK, Secretary of Internal Affairs.
DR. N. C. SCHAEFFER, Superintendent of Public Instruction.
DR. EDWIN EARLE SPARKS, President of the State College
HON. A. E. SISSON, Auditor General.
HON. N. B. CRITCHFIELD, Secretary of Agriculture.

APPOINTED BY THE GOVERNOR

R. I. Young, Middletown, Dauphin County,Term expires 1911
R. H. Thomas, Jr., Mechanicsburg, Cumberland CountyTerm expires 1912
Gen. James A. Beaver, Bellefonte, Centre County,Term expires 1913

APPOINTED BY THE STATE POULTRY ASSOCIATION

J. D. Nevius,Philadelphia,1910

APPOINTED BY THE PENNSYLVANIA BRANCH OF THE AMERICAN POULTRY ASSOCIATION

W. Theo. Wittman,Allentown,1913

ELECTED BY COUNTY AGRICULTURAL SOCIETIES

| | | Term expires. |
|------------------|-----------------------|----------------------------------|
| Adams, | A. I. Weidner, | Arendtsville,1912 |
| Allegheny, | A. J. Purdy, | Imperial, R. F. D. No. 1, ..1912 |
| Armstrong, | S. S. Blyholder, | Kelly Station,1914 |
| Beaver, | A. L. McKibben, | New Sheffield,1914 |
| Bedford, | David W. Lee, | Bedford,1912 |
| Berks, | H. G. McGowan, | Geiger's Mills,1913 |
| Blair, | W. Frank Beck, | Altoona,1914 |
| Bradford, | F. D. Kerrick, | Towanda,1913 |
| Bucks, | B. Frank Wambold, .. | Sellersville,1914 |
| Butler, | W. H. Milliron, | Euclid,1914 |

Term epires.

| | | | |
|-----------------------|---------------------------|------------------------------|------|
| Cambria, | Jas. Westrick, | Patton, R. F. D. No. 2, | 1913 |
| Cameron, | | | |
| Carbon, | | | |
| Centre, | John A. Woodward, | Howard, | 1912 |
| Chester, | M. E. Conard, | Westgrove, | 1912 |
| Clarion, | J. H. Wilson, | Clarion, | 1913 |
| Clearfield, | Peter Gearhart, | Clearfield, | 1913 |
| Clinton, | J. A. Herr, | Millhall, R. F. D., | 1914 |
| Columbia, | A. P. Young, | Millville, | 1912 |
| Crawford, | J. S. Patton, | Hartstown, | 1914 |
| Cumberland, | | | |
| Dauphin, | Edward S. Keiper, | Middletown, | 1914 |
| Delaware, | E. J. Durnall, | Swarthmore, | 1914 |
| Elk, | John M. Witman, | St. Mary's, | 1911 |
| Erie, | | | |
| Fayette, | | | |
| Forest, | | | |
| Franklin, | John P. Young, | Marion, | 1914 |
| Fulton, | J. L. Patterson, | McConnellsburg, | 1912 |
| Greene, | N. M. Biddle, | Carmichaels, | 1913 |
| Huntingdon, | Geo. G. Hutchison, | Warrior's Mark, | 1912 |
| Indiana, | S. C. George, | West Lebanon, | 1913 |
| Jefferson, | Peter B. Cowan, | Brookville, | 1913 |
| Juniata, | Matthew Rodgers, | Mexico, | 1912 |
| Lackawanna, | Horace Seamans, | Factoryville, | 1913 |
| Lancaster, | J. Aldus Herr, | Lancaster, | 1914 |
| Lawrence, | Sylvester Shaffer, | New Castle, | 1913 |
| Lebanon, | H. C. Snively, | Cleona, | 1913 |
| Lehigh, | P. S. Fenstermaker, | Allentown, | 1912 |
| Luzerne, | J. C. Hildebrant, | Dallas R. F. D., | 1914 |
| Lycoming, | A. J. Kahler, | Hughesville, | 1912 |
| McKean, | O. W. Abbey, | Turtle Point, | 1913 |
| Mercer, | W. C. Black, | Mercer, | 1914 |
| Mifflin, | M. M. Naginey, | Milroy, | 1913 |
| Monroe, | F. S. Brong, | Saylorsburg, | 1913 |
| Montgomery, | John H. Schultz, | Norristown, | 1914 |
| Montour, | J. Miles Derr, | Milton, R. F. D., | 1913 |
| Northampton, | C. S. Messinger, | Tatamy, | 1912 |
| Northumberland, | I. A. Eschbach, | Milton, R. F. D., | 1914 |
| Perry, | A. T. Holman, | Millerstown, | 1913 |
| Philadelphia, | David Rust, | Philadelphia, | 1913 |
| Pike, | | | |
| Potter, | | | |
| Schuylkill, | John Shoener, | New Ringgold, | 1913 |
| Snyder, | | | |
| Somerset, | John C. Weller, | Rockwood, | 1914 |
| Sullivan, | J. G. Colts, | Campbellsville, | 1914 |
| Susquehanna, | Frank A. Davies, | Montrose, | 1913 |
| Tioga, | Calvin H. DeWitt, | Mansfield, | 1914 |
| Union, | J. Newton Glover, | Vicksburg, | 1914 |
| Venango, | | | |
| Warren, | R. J. Weld, | Sugargrove, | 1914 |
| Washington, | D. S. Taylor, | Burgettstown, | 1914 |
| Wayne, | Warren E. Perham, | Pleasant Mount, | 1914 |
| Westmoreland, | M. P. Shoemaker, | Greensburg, | 1913 |
| Wyoming, | D. A. Knuppenburg, | Lake Carey, | 1913 |
| York, | G. F. Barnes, | Rossville, | 1914 |

OFFICERS

PRESIDENT

Hon. John K. Tener, Governor, Harrisburg.

VICE PRESIDENTS

Geo. G. Hutchison, Warrior's Mark.
 A. J. Kahler, Hughesville.
 Peter Gearhart, Clearfield.

EXECUTIVE COMMITTEE

Dr. M. E. Conard, Chairman, Westgrove.
 Dr. W. Frank Beck, Altoona.
 J. A. Herr, Millhall, R. F. D.
 Matthew Rodgers, Mexico.
 F. D. Kerrick, Towanda.
 M. M. Naginey, Milroy.
 D. A. Knuppenburg, Lake Carey.
 R. J. Weld, Sugargrove.
 A. P. Young, Millville.
 N. B. Critchfield, Secretary, Harrisburg.

ADVISORY COMMITTEE, CONSULTING SPECIALISTS AND STANDING COMMITTEES AS REPORTED BY THE EXECUTIVE COMMITTEE.

ADVISORY COMMITTEE

Matthew Rodgers, Mexico.
 J. A. Herr, Millhall, R. F. D.
 M. M. Naginey, Milroy.
 N. B. Critchfield, Secretary, Harrisburg.

CONSULTING SPECIALISTS

Botanist, Prof. W. A. Buckhout, State College.
 Pomologist, Gabriel Hiester, Harrisburg.
 Chemist, Dr. Wm. Frear, State College.
 Veterinary Surgeon, Dr. C. J. Marshall, Harrisburg.
 Sanitarian, Dr. W. H. Banks, Mifflintown.
 Microcopist and Hygienist, ... Prof. J. W. Kellogg, Harrisburg.
 Entomologist, Prof. Franklin Menges, York.
 Ornithologist, Prof. H. A. Surface, Harrisburg.
 Meteorologist, E. R. Demain, Harrisburg.
 Mineralogist, Baird Halberstadt, Pottsville.
 Apiarist, H. C. Klinger, Liverpool.
 Economic Geologist, Dr. Isaac A. Harvey, Lock Haven.
 Agricultural Geologist, W. H. Stout, Pinegrove.
 Forests and Forestry, Robert Conklin, Harrisburg.
 Feeding Stuffs, G. G. Hutchison, Warrior's Mark.

STANDING COMMITTEES

LEGISLATION

Hon. H. G. McGowan, Chairman, Geiger's Mills.
 P. Gearhart, Clearfield.
 Matthew Rodgers, Mexico.
 S. S. Blyholder, Kelly Station.
 Hon. H. C. Snavely, Cleona.

CEREALS AND CEREAL CROPS

J. Miles Derr, Chairman, Milton.

ROADS AND ROAD LAWS

J. C. Weller, Chairman, Rockwood.

FRUIT AND FRUIT CULTURE

J. P. Young, Chairman, Marion.

DAIRY AND DAIRY PRODUCTS

M. E. Conard, Chairman, West Grove.

FERTILIZERS

J. H. Shultz, Chairman, Norristown.

WOOL AND TEXTILE FIBERS

A. L. McKibben, Chairman, New Sheffield.

LIVESTOCK

A. P. Young, Chairman, Millville.

POULTRY

W. Theo. Wittman, Chairman, Allentown.

**PROCEEDINGS OF THE THIRTY-FOURTH ANNUAL
MEETING OF THE STATE BOARD OF AGRICULTURE,
HELD IN THE BOARD OF TRADE BUILDING,
HARRISBURG, PA., JANUARY 24, 25 AND 26, 1911.**

Harrisburg, Pa., January 24, 1911, 9 A. M.

Vice President S. S. Blyholder in the Chair.

The CHAIRMAN: The Board will please come to order, and the Secretary will call the roll.

The roll of members was then called by the Secretary and at this and subsequent roll calls the following persons answered:

R. I. Young, R. H. Thomas, Jr., Gen. James A. Beaver, W. Theo. Wittman, A. I. Weidner, A. J. Purdy, S. S. Blyholder, A. L. McKibben, David W. Lee, H. G. McGowan, W. Frank Beck, F. D. Kerrick, B. Frank Wambold, John A. Woodward, M. E. Conard, Peter Gearhart, J. A. Herr, A. P. Young, J. F. Seavy, E. J. Durnall, John P. Young, George G. Hutchison, Peter B. Cowan, Matthew Rodgers, Horace Seamans, J. Aldus Herr, Sylvester Shaffer, H. C. Snavely, A. J. Kahler, W. C. Black, M. M. Naginey, F. S. Brong, J. H. Shultz, J. Miles Derr, C. S. Messinger, I. A. Eschbach, A. T. Holman, John Shoener, John C. Weller, E. R. Warburton, J. Newton Glover, R. J. Weld, Warren E. Perham, M. P. Shoemaker, D. A. Knuppenburg and G. F. Barnes.

Ex-officio members:

Hon. John K. Tener, Governor, Dr. N. C. Schaeffer, Superintendent of Public Instruction, Dr. Edwin Earle Sparks, President of the State College and Hon. N. B. Critchfield, Secretary of Agriculture.

The following Consulting Specialists were also in attendance: Gabriel Hiester, Pomologist; Prof. J. W. Kellogg, Microscopist and Hygienist; Prof. Franklin Menges, Entomologist; Prof. H. A. Surface, Ornithologist; Baird Halberstadt, Mineralogist; W. H. Stout, Agricultural Geologist; G. G. Hutchison, Feeding Stuffs.

The SECRETARY: (After calling of roll) There is a quorum present, Mr. Chairman.

The CHAIRMAN: We are now ready to proceed with the reading of the minutes. The Secretary will now read the minutes of the Spring Meeting of the State Board of Agriculture, held in Butler, Pa., Tuesday, May 24, 1910.

The minutes were then read by the Secretary.

The CHAIRMAN: Gentlemen, you have heard the reading of the minutes. Are there any corrections?

MR. HUTCHISON: Mr. Chairman, I move the minutes be received and approved.

MR. R. I. YOUNG: Mr. Chairman, I second the motion.

The motion was agreed to.

The CHAIRMAN: I will appoint the Committee on Credentials as follows; Matthew Rodgers, of Juniata County; D. A. Knuppenburg, of Wyoming County; M. M. Naginey, of Mifflin County; Peter Gearhart, of Clearfield County, and E. R. Warburton of Sullivan County.

The Chairman of the Committee will please come forward and receive the credentials already handed in. If there are any other credentials to hand in before we proceed with the regular program turn them over to the Chairman of the Credential Committee now.

MR. RODGERS, Chairman of the Credential Committee: The members of the Credential Committee will please retire with me now to the ante-room to act on the credentials presented.

The CHAIRMAN: We are now ready to take up the reports of the Standing Committees and Specialists. The first on the program is the Report of the Committee on Cereals and Cereal Crops. J. Miles Derr, Chairman, Milton, Penna.

This report was then read by Mr. Derr as follows:

REPORT OF THE COMMITTEE ON CEREALS AND CEREAL CROPS.

By J. MILES DERR, *Chairman.*

The production of cereals and cereal crops may be considered the greatest industry of the present day. On account of its importance to all classes of people it should receive a great deal of consideration. We have in our country several million acres of as fine land as ever kissed by the sun or tickled with a hoe. One crop from the farms of our great country would pay for all the railroad property of the United States.

Corn.

Let us consider a few of the leading cereals produced in the United States: "Corn is King," and has been properly named on account of its importance as a feed and value of the product. It is by far the most valuable cereal we raise. Our corn crop is worth more every year than all we get from our gold, silver and lead mines. It has been estimated that our corn crop is worth more than twice as much as our wheat crop. Our annual corn crop averages more than two billion bushels of shelled corn every year. Corn is raised in nearly every part of the United States. Ohio has the highest average per acre, about forty-two bushels; Pennsylvania third

and Florida lowest, about eleven bushels per acre. More than one-half of our corn crop comes from the seven great states: Illinois, Iowa, Missouri, Kansas, Nebraska, Indiana and Ohio. This is the greatest corn patch on the face of the earth. It produces more than one billion bushels of corn every year, or more than one-half our corn crop. Can we realize how much corn one billion bushels is. Suppose it would be loaded upon wagons, forty bushels of shelled corn to a wagon, and driving the teams so that the noses of each team would just reach the tailboard of the wagon in front of it, making a continuous train of wagons more than one hundred and fifty thousand miles long, or long enough to reach six times around the world. These seven states produce about one-half of our corn crop, and if we want to know how many wagons it would take to carry a whole crop, multiply the number by two.

What is done with this immense crop of corn? About nineteen-twentieth of it is fed to stock in this country. About one twentieth is shipped to Europe. Corn is the chief food of about forty million hogs raised annually in this country.

Wheat.

Winter wheat may be considered second in value and importance. Wheat is one of the most important grains known to man. It has been used for ages by the people of the Old World. Wheat was not known in this hemisphere before the time of Columbus, and our continent now produces more wheat than any other grand division of the globe. The United States as a nation takes the lead in the production of wheat. A large percentage of the people of Europe eat bread made from our wheat. Millions of bushels of this grain every year cross the Atlantic, and, with the exception of cotton, we get more for our wheat from foreign countries than any other crop. Wheat is grown in nearly all parts of the United States, but our best wheat lands lie north of the Ohio and Missouri rivers. Let us note some facts about one of the largest wheat farms in our country:

On a certain wheat farm in North Dakota there are two hundred and fifty pairs of work horses and mules, two hundred plows, one hundred and fifteen harvesting machines, and twenty threshing machines run by steam. When the grain is ripe, four hundred men are employed to harvest it, and at the time of threshing there are six hundred men at work. Some of the fields contain 500 acres each. The men working in them labor in companies, under mounted overseers. In plowing the ground, scores of sulky plows, driven by men who sit on the plows, will move across the field together, plowing several acres each round.

Harvesting on these big farms is a wonderful sight. On such a farm as the one being described, the work of cutting and threshing is done at the same time by a combined harvester and thresher. Some of these great machines are drawn by steam engines; others by teams of twenty-five to thirty horses or mules. A single machine with four men will gather and thresh from seventeen hundred to three thousand bushels of wheat in a day.

The next question is, How is the wheat cared for after it leaves the fields?

This is almost as great a business as raising the wheat. At some of the railroad stations in the wheat belt, and at all the large grain ports of the United States, there are large elevators, or granaries, used for storing the grain until it is wanted for sale. A single elevator often has storage room for more than a million bushels of grain. The elevators at Minneapolis alone can hold almost thirty million bushels at one time.

The great wheat crop and the location at the head of navigation on the Mississippi River has caused two thriving commercial cities to be built, known as the "Twin Cities of the Northwest"—Minneapolis and St. Paul. They contain some of the finest business blocks in our country. The two cities now almost join, although their business centers are about ten miles apart. I have just described the greatest belt in the United States, and yet their average yield per acre would not satisfy many of our Pennsylvania farmers who are accustomed to having average yields of twenty bushels per acre, and I have in mind plots of 15 acres and more yielding an average of thirty-two bushels per acre.

Oats.

The oats crop of the country ranks third in importance. We produce about one billion bushels annually and it is worth three hundred million dollars.

Oats are produced in every state and territory in the United States. Iowa leads in the number of acres sown, Arizona the lowest. Utah leads in the average number of bushels per acre, being about forty-three bushels per acre, and Florida the lowest, with fourteen bushels per acre. Iowa produces the greatest number of bushels. Florida has the highest price per bushel, South Dakota the lowest.

Other Products.

Next in importance is barley. California leads in total number of bushels produced, with about thirty-seven million bushels. California also leads in the number of dollars to her credit.

Rye comes next in importance. All but ten of the states and territories produce rye. Michigan leads in number of acres. Idaho produces most bushels per acre. Pennsylvania leads in total number of bushels. South Carolina has the highest average price per bushel, being one dollar and a quarter. Pennsylvania leads in the total value of rye, having to her credit about three and one-half million dollars.

Buckwheat is a very important crop, for several reasons: It is a quick crop and is in demand as soon as harvested; it can be produced on land that will not produce wheat, corn or oats successfully. Buckwheat is grown in twenty-four states. New York leads with 321,552 acres. Maine has the highest number of bushels per acre, about twenty-seven bushels, and Iowa the lowest, twelve bushels per acre. New York is the banner buckwheat state, her crop annually being worth three and one-half million dollars, or about one-third of the value of the buckwheat crop of the United States.

Flax, another important crop, is raised in this country for the seed which is manufactured into oil and meal. About two and one-half million acres are producing flax with an average of a little more

than ten bushels per acre. In some sections during 1910 flaxseed was worth two and one-half dollars per bushel. In the production of flax, North Dakota leads in number of acres, the total number of bushels and value of its crop amounts to nearly fifteen million dollars.

Rice is produced in nine or ten states, with Louisiana leading in number of acres, 308,000, the greatest number of bushels and the largest total value, being nearly eight million dollars, which is about one-half the value of our whole crop.

The United States Department of Agriculture reports the total production of corn at 3,125,713,000 bushels as compared with 2,772,376,000 bushels for 1909, 27.4 bushels average per acre for 1910 as compared with 25.5 bushels the ten year average.

These figures seem large, and it is hard to realize how enormous they are, yet the latest census report showing the great increase in the population of our country, and especially, the alarming increase in our cities, makes it apparent that the greatest problem before the farmers of our fair country at the present time is the conservation of soil fertility, and its economical increase. Another half century of the reckless and wasteful manner of using the soil, as has been done in nearly all sections of our country, will see the highest cost of living that has ever afflicted any nation.

The United States report gives a comprehensive view of the crop of this country. One of our local papers gives a little better idea of the intensive farming of Pennsylvania. It is as follows:

"GREAT FARM STATE. PENNSYLVANIA LEADS ALL THE OTHERS IN INTENSIVE FARMING. PRODUCED FIVE PER CENT. OF THE CROP VALUE ON LESS THAN FOUR PER CENT. OF THE ACREAGE. That the State of Pennsylvania is leader in intensive farming, the doctrine of which is being preached by the State College and the Pennsylvania railroad, is indicated by statistics just compiled by the Pennsylvania Railroad Company for 1910 which show that Pennsylvania last year had 8,384,000 acres in cultivation in corn, barley, buckwheat, hay, oats, potatoes, rye, tobacco and wheat. This is 3.503 per cent. of the total of 239,343,800 acres under cultivation in these crops in the United States, and the average value per acre in the State of Pennsylvania was \$20.56 as compared with \$14.53 for the average value per acre throughout the country. These figures are of special interest to the Pennsylvania Railroad, which in the past four years has been conducting an active campaign in the interests of scientific farming. Much instructive literature has been disseminated by the railroad company in pamphlet form, while farmers' special educational trains have been operated on various divisions from time to time. In this work the railroad company is co-operating with the State Agricultural Department and the State College of Agriculture. The Pennsylvania railroad recently announced that it had found its farming campaign a profitable one and that it intended to prosecute it vigorously during the present winter. Arrangements are being made for demonstrations and lectures to be given in various parts of the State of Pennsylvania. The country's total farm crop value of barley, buckwheat, corn, hay, oats, potatoes, rye, tobacco and wheat in 1910 was \$3,478,417,773 and Pennsylvania's share of this was \$172,362,500, or approximately five per cent. of the total, with only 3.5 per cent. of the acreage. Added

interest is given to these figures in view of the fact that in 1909 Pennsylvania's acreage in the above crops was 3.547 per cent. of the total of the country, with the percentage of the farm crop value for Pennsylvania of 4.311, compared with 1910. Pennsylvania's percentage of acreage decreased, but her percentage of the revenue in these crops increased.

MR. J. A. HERR: Mr. Chairman, I move that the report be received and placed on file for publication with the proceedings of the Board.

The motion was seconded and agreed to.

The CHAIRMAN: The next on the program is the Report of the Committee on Roads and Road Laws, H. C. Snavely, Chairman, Cleona, Penna.

The SECRETARY: Mr. Chairman, I have a letter from Mr. Snavely that came in just a little while ago. It is addressed to me personally. Shall I read it?

The CHAIRMAN: The Secretary will please read the letter.

The Secretary read Mr. Snavely's letter as follows:

"Cleona, Pa., Jan. 23, 1911.

Hon. N. B. Critchfield,
Harrisburg, Penna.

Dear Sir: I have been confined to bed and to the house since Thursday night when I took sick rather suddenly.

My coming to Harrisburg tonight or tomorrow will depend upon the advice of the doctor when he comes to see me this P. M.

I wish also to say that I have not written a report as Chairman of Committee of Roads and Road Laws.

I had written to a number of members of the Board and others for their views, but receiving only a few replies I deferred the matter until my return home last week when I took ill. I would be very sorry if I would miss all the meetings this week.

Yours truly,

HENRY C. SNAVELY."

The CHAIRMAN: Gentlemen, you have heard the communication. What action will you take? If there are no objections we will proceed and enter it upon the journal of our proceedings.

The SECRETARY: Mr. Chairman, I have another letter here from Mr. Cowan, also addressed to me personally.

The CHAIRMAN: The Secretary will please read Brother Cowan's communication.

The Secretary read Mr. Cowan's letter as follows:

"Brookville, Pa., Jan. 23, 1911.

Hon. N. B. Critchfield,
Secretary of Agriculture,
Harrisburg, Pa.

My dear Sir: Owing to the death of a dear sister, I will be unable to attend the early sessions of the State Board of Agriculture, but will try to reach there some time Wednesday, 25.

Trusting the meeting will be a pleasant and profitable one, I remain,

Verly truly yours,

P. B. COWAN."

The CHAIRMAN: The communication will be received and entered upon the journal of our proceedings.

The SECRETARY: Mr. Chairman, I have also received a letter from Mr. Fenstermaker, addressed to me personally.

The CHAIRMAN: The Secretary will please read Brother Fenstermaker's letter.

The Secretary read Mr. Fenstermaker's letter as follows:

Allentown, Pa., Jan. 23, 1911.

Hon. N. B. Critchfield,
Harrisburg, Pa.

My dear Sir: The very sudden and unexpected death of our beloved daughter Anna, aged 22 years, has made it impossible for me to attend your great meetings.

Overcome with grief and cares, allow me to predict that these meetings with your most excellent program of a feast of good things can not but help to produce results in creating a more intense interest for better agriculture. Kindly convey my regrets to the members of the State Board and oblige,

Very sincerely yours,

P. S. FENSTERMAKER."

The CHAIRMAN: The communication will be received and entered upon the journal of our proceedings.

MR. HUTCHISON: Mr. Chairman, I move that the Secretary be directed to reply to the letter of Brother Fenstermaker, extending our sympathies in this said hour of bereavement.

The motion was seconded and agreed to.

The SECRETARY: Mr. Chairman, I have prepared a telegram in expectation of this. I felt every assurance that somebody would make the motion, and the telegram that I propose to send, if approved, is as follows:

"The Hon. P. S. Fenstermaker,
Allentown, Penna.

At the Annual Meeting of the State Board of Agriculture, now assembled, the society unanimously voted that we extend to our co-worker, Hon. P. S. Fenstermaker, of Allentown, Pa., the expression of our sympathy in the time of such bereavement that has so suddenly fallen upon his home."

The CHAIRMAN: Without any further motion the Secretary, by direction of the Board, will forward that message.

The CHAIRMAN: The next on the program is the Report of the Committee on Fruit and Fruit Culture, D. A. Knuppenburg, Lake Carey, Pa. Is Mr. Knuppenburg present?

MR. HUTCHISON: I believe he is on the Committee on Credentials.

The SECRETARY: Mr. Hutchison, will you be kind enough to ask the Committee to excuse him until he makes his report?

Mr. CHAIRMAN: While there is nothing before the Board, I wish to announce that it will be necessary for us at some time to have a report of the Memorial Committee, and I think possibly it might be well to appoint that Committee at this time, so that if the Committee wish to do so they can collect any facts that they wish to incorporate in their record. I don't want to make the motion, but if there is no objection, knowing that such Committee is needed, I cannot see why the Chairman cannot proceed to the appointment of such Committee and yet, if it be thought best, it will be all right to make the motion. I make this suggestion simply for the reason that it is so customary to make the originator of the motion the Chairman of the Committee that perhaps the members of the Board might hesitate to make the motion for that reason.

The CHAIRMAN: Do I hear a motion to that effect?

MR. WELD: Mr. Chairman, I move that the Memorial Committee be appointed by the Chair.

The motion was agreed to.

MR. HUTCHISON: Mr. Chairman, I find Mr. Knuppenburg is not with the Committee and I cannot find him upstairs at the Horticultural meeting, though he is said to be about.

The SECRETARY: Mr. Chairman, are you ready to announce that Committee while we wait?

The CHAIRMAN: I will appoint as the Memorial Committee Mr. Weld, Mr. Black and Mr. Hutchison.

The SECRETARY: Mr. Chairman, I would suggest that in the absence of Mr. Knuppenburg, perhaps someone who is on the program for this afternoon to make a report can be heard now.

The CHAIRMAN: Very good suggestion. Now, will some gentleman who is on the program for this afternoon volunteer to make his report now?

The SECRETARY: I was just going to suggest that possibly Mr. Hutchison might go ahead.

MR. HUTCHISON: I guess the best thing to do when a fellow has a bad job is to get rid of it. I have my report here but not quite classified as I wish to have it. Though I have not got it paged, I think I can go on with it, and if I get off at the wrong place when it gets to the printer I will endeavor to have it then in the proper shape. If you will take chances on it I will go ahead.

The CHAIRMAN: We will now hear from Mr. Hutchison, on the Report on Feeding Stuff.

MR. HUTCHISON: Mr. Chairman, I am not going to read all of this report. I would just say before I read that this work has developed so largely that it is an impossibility to make a report of all the work that is done by the Secretary, and by his assistants, or those employed by him. It would require a bulletin to make such a report to you. But I will refer in my report to a bulletin that is published that will give you a large proportion of the work accomplished.

Mr. Hutchison thereupon read his report as follows:

REPORT OF THE COMMITTEE ON FEEDING STUFFS.

By GEORGE G. HUTCHISON, *Chairman.*

To the Honorable Members of the State Board of Agriculture:

As your Chairman of Committee on Concentrated Commercial Feeding Stuff's, I beg leave to make you the following report for the year 1910:

With our new law that was placed upon the statute books by the last Legislature, which went into effect August 1st, 1909, we were in a position to proceed with our work with new courage. As stated to you in our last report, the old law was declared unconstitutional by Judge Tressler of Lehigh county. Our determination was to rid the State as far as possible of all feeds that were adulterated and falsely guaranteed. I hope to show you in this report that we have been in a measure successful, and that we have entered upon an epoch in the control of the sale of Concentrated Commercial feeds in Pennsylvania.

I would first call your attention to the condition that exists among the millers in our own State. Before the passage of a Feeding Stuff Law, a large number of them bought adulterants to adulterate their feeds, but at the present time, the majority of them are grinding whole grains, that is, corn, oats and rye. They do not compound or mix to any great extent. Rather, they buy their concentrated feeds from the large manufacturers in the West and sell them as they are received. The millers of our State still pursue the old practice of grinding ear corn, but this is not considered as good a feed as it was in former years, as hogs will not eat the chop which contains corn cobs unless they are ground very fine. I do not want to lead you to believe that our millers in Pennsylvania are perfect, but they are doing a business that is nearer the honest dealer than they did in the past. Our great supply of commercial feeds comes from Ohio, Illinois, Indiana, Wisconsin, Minnesota, Kansas and other Western states. Each has a by-product to sell. As we are the great market for feeds, they are all busy looking after their interests, and in this, I do not blame them, if they will give our farmers and stock feeders the worth of their money. The business of the Department of Agriculture, through its Secretary and his agents, is to see that this is done. The feeds sold in Pennsylvania showed a marked improvement.

As stated in my previous report, *I am still advocating the doctrine that all feeds should be sold on their protein and fat value and their low fiber constituency, or the higher the protein and fat and the lower the crude fiber, the more valuable the feed.*

Gentlemen, it is time for you to **STOP, THINK and CONSIDER** the great question of purchasing your feed supply on the basis that I have laid down to you. For your information, and that it may be convenient for you to refer to when you receive this report printed in the proceedings of this meeting, I have compiled the following table:

TABLE OF ANALYSIS.

| Name of Feeding Stuff. | Crude Protein. | Crude Fat. | Crude Fiber. |
|---|----------------|------------|--------------|
| | Per cent. | Per cent. | Per cent. |
| Corn, | 10.40 | 5.00 | 2.00 |
| Hominy chop or feed, | 9.80 | 8.30 | 2.80 |
| Gluten meal, | 29.30 | 11.30 | 3.30 |
| Gluten feed, | 24.00 | 10.60 | 5.30 |
| Dried distillers' grain, largely from corn, | 30.80 | 13.30 | 12.00 |
| Oats, | 11.80 | 5.00 | 9.50 |
| Oats shorts, | 16.00 | 7.10 | 6.10 |
| Wheat, | 11.90 | 2.10 | 1.80 |
| Wheat bran, | 15.40 | 4.00 | 9.00 |
| Wheat middlings, | 15.60 | 4.00 | 4.60 |
| Wheat shorts, | 14.90 | 4.50 | 7.40 |
| Barley, | 12.40 | 1.80 | 2.70 |
| Barley meal, | 10.50 | 2.20 | 6.50 |
| Brewers' grain, dry, | 26.00 | 5.60 | 1.40 |
| Malt sprouts, | 27.20 | 2.00 | 13.00 |
| Rye, | 10.60 | 1.70 | 1.70 |
| Rye bran, | 14.70 | 2.80 | 3.50 |
| Buckwheat, | 10.00 | 2.20 | 8.70 |
| Buckwheat bran, | 12.40 | 3.50 | *31.90 |
| Buckwheat middlings, | 28.90 | 7.10 | 4.10 |
| Buckwheat shorts, | 27.10 | 7.60 | 8.30 |
| Cottonseed, | 18.40 | 19.90 | 23.20 |
| Cottonseed meal, | 42.30 | 13.10 | †5.60 |
| Flaxseed, | 22.60 | 33.70 | 7.10 |
| Linseed meal, O. P., | 32.90 | 7.90 | 8.90 |
| Linseed meal, N. P., | 33.20 | 8.00 | 9.50 |
| Corn silage, | 1.07 | 0.80 | 6.00 |
| Alfalfa hay meal, | 14.3 | 2.20 | 25.33 |

*Note high per cent. †No hulls.

This table gives you the analysis of the cereals as nature produces them. It also gives you the analysis of the by-product as the chemists find them, and I hope that this table may aid you in becoming educated in regard to the feeds that go to make up the concentrated pure feeds that are on the market.

I am often asked the question, "What is the analysis of the adulterants that are mixed with the feeds that are found on our markets?" I will give you a table of the adulterants that we have found on the markets of Pennsylvania:

| Name of Adulterant. | Crude Protein. | Crude Fat. | Crude Fiber. |
|--------------------------|----------------|------------|--------------|
| | Per cent. | Per cent. | Per cent. |
| Corn cobs, ground, | 2.40 | 0.50 | 30.33 |
| Oat hulls, | 3.00 | 1.00 | 29.33 |
| Buckwheat hulls, | 4.60 | 1.10 | 43.30 |

By referring to the law, you will find that corn cobs can only be mixed with corn products, such as corn meal, hominy and gluten. In our work for the year, we have not found any corn cobs mixed with gluten. We have found one firm mixing corn cobs with hominy feed and another firm manufactures a feed, using corn on the ear and hominy, but the fiber in this feed has been kept at about 10 per cent. as the law requires, except in two samples, and in these cases your Secretary ordered prosecution. We secured conviction in both cases and the fine of \$50.00 and costs were paid, which were covered into the State Treasury.

Oat hulls are a common mixture with feed, but the law says that if used, they must be so stated in the composition, and that the fiber content of said feed shall not exceed more than 9 per cent. with a variation of 10 per cent. of the 9 per cent. which would make 9.90 per cent. We have had some trouble with the manufacturers who are using oat hulls in a mixture, to keep their fiber near the amount stated. They claimed that they had old goods on the market of Pennsylvania, and that we had secured samples of this. They also claimed that they had trouble in mixing their goods to comply with the law. After a few prosecutions were brought, this firm placed on our markets feeds that now comply with the law. One firm indicated that they were going to withdraw their goods from our markets, and this is a matter which they will have to decide for themselves.

The great trouble during the year that we have had to contend with, has been the molasses feeds that were found upon the markets of Pennsylvania. The law prohibits the mixing of weed seeds with any feeds sold in our State. A number of manufacturers of molasses feeds persisted in mixing all kinds of weed seeds in their feeds. Their attention was called to these violations, but they still continued to mix weed seeds with their feeds. The Secretary directed prosecution against the said firms, and we have secured conviction in each case, and we believe that we will be able by constantly looking after the matter to prohibit the mixing of weed seeds with any concentrated commercial feeds sold in our State. We think it is time that some of the Eastern states that are consumers of feeds as we are, would endeavor to have passed a law similar to our own. The Pure Food Law protects the human race, and we as men should protect the animals that cannot say what they will eat, but have to eat what is given them or do without. There should be more education on this subject. Six years ago, there was very little known about the analysis of feeds, in fact, very few knew what protein and fat were, and it was only four years ago that we had written in the law, directing the manufacturer should give the analysis for fiber. The question came up at once, What had fiber to do with the foods? But you are all coming to find out.

I do not wish to criticize any of the educational departments of our State, but I was very sorry to see that at the last Farmers' Week at State college, there was not one person on the program to give any instruction on commercial feeds, and in looking over the list of lecturers at Farmers' Institutes I can only find one who was scheduled to talk on this great subject. I believe the question is important enough to the farmers and dairymen of Pennsylvania to have some one on each section of the Farmers' Institute force that could or

would talk on commercial feeds as they are found in Pennsylvania. You will find a large number of instructors who are able to tell you all about fertilizers and other subjects.

By the last information that was secured in the Department of Agriculture in regard to the amount of fertilizers sold in the State, it was estimated between six and seven millions of dollars worth, and after consulting with men who I believe know, I am safe in saying there are more than thirty millions of dollars worth of concentrated commercial feeding stuffs sold in Pennsylvania during 1910. This will give some idea of the importance of this subject.

I hereby give you a table that gives the names of the county, town or city visited, number of samples taken in each town, number of samples taken in each county and number of towns visited where no samples were taken.

This table shows that there were 1500 samples taken by our Special Agent in 1910. It also shows the number of towns that were visited in which there were no samples taken. The reason that there were no samples taken in these towns, was that the feed on sale had been sampled in other towns near by. We could not visit near all the feed stores in each county, as it would have consumed all the time of the agent, and it would have been impossible to visit all the counties of the Commonwealth. This matter will be referred to under the head of "Our Needs."

TABULATED STATEMENT.

| Name of County Visited. | Name of Town or City Visited. | Number of samples taken in each town. | Number of samples taken in county. |
|-------------------------|-------------------------------|--|---------------------------------------|
| Indiana, ----- | 1. Blairsville, ----- | 8 | 28 |
| | 2. Saltsburg, ----- | 5 | |
| | 3. Blacklick, ----- | 0 | |
| | 4. Homer City, ----- | 7 | |
| | 5. Indiana, ----- | 8 | |
| | 6. Ernest, ----- | 0 | |
| | 7. Clyner, ----- | 0 | |
| | 8. Creekside, ----- | 0 | |
| Cambria, ----- | 1. Patton, ----- | 5 | 33 |
| | 2. Hastings, ----- | 2 | |
| | 3. Barnesboro, ----- | 3 | |
| | 4. Carrolltown, ----- | 2 | |
| | 5. Ebensburg, ----- | 1 | |
| | 6. Johnstown, ----- | 17 | |
| | 7. South Fork, ----- | 0 | |
| | 8. Gallitzin, ----- | 0 | |
| | 9. Scalp level, ----- | 0 | |
| | 10. Conemaugh, ----- | 0 | |
| | 11. Oresson, ----- | 3 | |
| Susquehanna, ----- | 1. Montrose, ----- | 9 | 32 |
| | 2. Alford, ----- | 1 | |
| | 3. New Milford, ----- | 7 | |
| | 4. Great Bend, ----- | 3 | |
| | 5. Susquehanna, ----- | 10 | |
| | 6. Lanesboro, ----- | 2 | |
| | 7. Oakland, ----- | 0 | |
| | 8. Halstead, ----- | 0 | |

NOTE: No samples were taken in some towns, where indicated, from the fact that the feed found had been sampled.

TABULATED STATEMENT—Continued.

| Name of County Visited. | Name of Town or City Visited. | Number of samples taken in each town. | Number of samples taken in county. |
|-------------------------|-----------------------------------|--|---------------------------------------|
| Bradford, ----- | 1. Towanda, ----- | 4 | 41 |
| | 2. Ulster, ----- | 8 | |
| | 3. Monroeton, ----- | 4 | |
| | 4. Towanda, R. F. D. No. 3, ----- | 3 | |
| | 5. Athens, ----- | 3 | |
| | 6. Sayre, ----- | 4 | |
| | 7. Troy, ----- | 6 | |
| | 8. Alba, ----- | 6 | |
| | 9. Canton, ----- | 3 | |
| | 10. South Waverly, ----- | 0 | |
| | 11. Milan, ----- | 0 | |
| Bedford, ----- | 1. Everett, ----- | 1 | 15 |
| | 2. Bedford, ----- | 14 | |
| Bucks, ----- | 1. Quakertown, ----- | 2 | |
| | 2. Richland Centre, ----- | 4 | |
| | 3. Doylestown, ----- | 9 | |
| | 4. Chalfont, ----- | 0 | |
| | 5. Lansdale, ----- | 0 | |
| | 6. Colmer, ----- | 0 | |
| Tioga, ----- | 1. Wellsboro, ----- | 16 | 34 |
| | 2. Westfield, ----- | 7 | |
| | 3. Elkland, ----- | 3 | |
| | 4. Knoxville, ----- | 8 | |
| | 5. Osceola, ----- | 0 | |
| | 6. Cownesque, ----- | 0 | |
| Potter, ----- | 1. Coudersport, ----- | 13 | 13 |
| | 2. Ulysses, ----- | 0 | |
| McKean, ----- | 1. Port Allegany, ----- | 8 | |
| | 2. Kane, ----- | 9 | |
| | 3. Bradford, ----- | 16 | |
| | 4. Mt. Jewett, ----- | 0 | |
| | 5. Eldred, ----- | 0 | |
| Cameron, ----- | 1. Emporium, ----- | 10 | 10 |
| | 2. Driftwood, ----- | 0 | |
| Elk, ----- | 1. Ridgway, ----- | 8 | |
| | 2. St. Marys, ----- | 8 | |
| | 3. Johnsonburg, ----- | 3 | |
| Warren, ----- | 1. Warren, ----- | 10 | 13 |
| | 2. Youngsville, ----- | 3 | |
| Westmoreland, ----- | 1. Derry, ----- | 4 | 61 |
| | 2. Latrobe, ----- | 3 | |
| | 3. Greensburg, ----- | 16 | |
| | 4. Irwin, ----- | 8 | |
| | 5. Jeannette, ----- | 9 | |
| | 6. Manor, ----- | 0 | |
| | 7. Mount Pleasant, ----- | 8 | |
| | 8. Scottdale, ----- | 5 | |
| | 9. Belle Vernon, ----- | 2 | |
| | 10. New Kensington, ----- | 4 | |
| | 11. Parnassus, ----- | 0 | |
| | 12. Monessen, ----- | 2 | |
| Fayette, ----- | 1. Uniontown, ----- | 13 | 14 |
| | 2. Connellsville, ----- | 0 | |
| | 3. Belle Vernon, ----- | 1 | |

NOTE: No samples were taken in some towns, where indicated, from the fact that the feed found had been sampled.

TABULATED STATEMENT—Continued.

| Name of County Visited. | Name of Town or City Visited. | Number of samples taken in each town. | Number of samples taken in county. |
|-------------------------|-------------------------------|--|---------------------------------------|
| Allegheny, ----- | 1. McKeesport, ----- | 5 | 53 |
| | 2. Pittsburg, ----- | 10 | |
| | 3. Wilkinsburg, ----- | 8 | |
| | 4. Carnegie, ----- | 12 | |
| | 5. Wilmerding, ----- | 5 | |
| | 6. Pitcairn, ----- | 3 | |
| | 7. Braddock, ----- | 10 | |
| Washington, ----- | 1. Monongahela, ----- | 7 | 45 |
| | 2. Charleroi, ----- | 6 | |
| | 3. Washington, ----- | 18 | |
| | 4. Canonsburg, ----- | 14 | |
| | 5. Houston, ----- | 0 | |
| Greene, ----- | 1. Waynesburg, ----- | 5 | 5 |
| Armstrong, ----- | 1. Apollo, ----- | 4 | 29 |
| | 2. Vandergrift, ----- | 3 | |
| | 3. Leechburg, ----- | 5 | |
| | 4. Kittanning, ----- | 14 | |
| | 5. Ford City, ----- | 1 | |
| | 6. Manorville, ----- | 2 | |
| Beaver, ----- | 1. New Brighton, ----- | 8 | 13 |
| | 2. Beaver, ----- | 1 | |
| | 3. West Bridgewater, ----- | 1 | |
| | 4. Monaca, ----- | 3 | |
| | 5. Beaver Falls, ----- | 0 | |
| Lancaster, ----- | 1. Lancaster, ----- | 23 | 83 |
| | 2. Lititz, ----- | 9 | |
| | 3. Leaman Place, ----- | 6 | |
| | 4. Manheim, ----- | 8 | |
| | 5. Kinzer, ----- | 5 | |
| | 6. Ephrata, ----- | 2 | |
| | 7. Columbia, ----- | 6 | |
| | 8. Elizabethtown, ----- | 14 | |
| | 9. Christiana, ----- | 4 | |
| | 10. Witmer, ----- | 3 | |
| | 11. Bird-in-hand, ----- | 3 | |
| | 12. Paradise, ----- | 0 | |
| | 13. Gap, ----- | 0 | |
| | 14. Ronk, ----- | 0 | |
| | 15. Strasburg, ----- | 0 | |
| | 16. Mt. Joy, ----- | 0 | |
| York, ----- | 1. York, ----- | 32 | 14 |
| | 2. Hanover, ----- | 12 | |
| Chester, ----- | 1. Coatesville, ----- | 8 | 30 |
| | 2. Parkesburg, ----- | 6 | |
| | 3. Downingtown, ----- | 4 | |
| | 4. Mortonville, ----- | 2 | |
| | 5. Modena, ----- | 0 | |
| | 6. West Chester, ----- | 15 | |
| | 7. Kennett Square, ----- | 4 | |
| | 8. Westgrove, ----- | 0 | |
| | 9. Phoenixville, ----- | 0 | |
| Mifflin, ----- | 1. Lewistown, ----- | 10 | 12 |
| | 2. MeVeytown, ----- | 2 | |
| | 3. Reedsville, ----- | 0 | |
| Juniata, ----- | 1. Port Royal, ----- | 2 | 5 |
| | 2. Mifflin, ----- | 3 | |

NOTE: No samples were taken in some towns, where indicated, from the fact that the feed found had been sampled.

TABULATED STATEMENT—Continued.

| Name of County Visited. | Name of Town or City Visited. | Number of samples taken in each town. | Number of samples taken in county. |
|-------------------------|---|--|---------------------------------------|
| Jefferson, ----- | 1. Lindsey, ----- 2. Punxsutawney, ----- 3. Reynoldsville, ----- 4. Brookville, ----- | 3 3 4 4 | 14 |
| Lycoming, ----- | 1. Williamsport, ----- 2. Newberry, ----- 3. Montoursville, ----- 4. Williamsport, R. F. D. 1, ----- 5. Muncy, ----- | 19 5 3 3 0 | 30 |
| Clinton, ----- | 1. Lock Haven, ----- 2. Flemington, ----- 3. Renovo, ----- 4. Millhall, ----- | 8 2 7 0 | 17 |
| Centre, ----- | 1. Bellefonte, ----- 2. Philipsburg, ----- | 4 18 | 22 |
| Adams, ----- | 1. Gettysburg, ----- | 5 | 5 |
| Franklin, ----- | 1. Waynesboro, ----- 2. Greencastle, ----- 3. Chambersburg, ----- 4. Scotland, ----- | 55 2 12 7 | |
| Cumberland, ----- | 1. Shippensburg, ----- 2. Newville, ----- 3. Carlisle, ----- 4. Mt. Holly Springs, ----- 5. Mechanicsburg, ----- | 8 8 10 8 6 | 40 |
| Dauphin, ----- | 1. Harrisburg, ----- 2. Middletown, ----- 3. Steelton, ----- | 19 4 3 | 26 |
| Lebanon, ----- | 1. Lebanon, ----- 2. Myerstown, ----- 3. Annville, ----- | 13 17 0 | 30 |
| Berks, ----- | 1. Reading, ----- 2. Mt. Penn, ----- 3. Kutztown, ----- 4. Fleetwood, ----- 5. Birdsboro, ----- 6. Boyertown, ----- 7. Lyons, ----- | 36 1 5 3 0 0 0 | |
| Lehigh, ----- | 1. Allentown, ----- | 37 | |
| Huntingdon, ----- | 1. Huntingdon, ----- 2. Mapleton, ----- 3. Mt. Union, ----- 4. Petersburg, ----- | 8 7 8 0 | 23 |
| Blair, ----- | 1. Altoona, ----- 2. Martinsburg, ----- 3. Hollidaysburg, ----- 4. Tyrone, ----- 5. Juniata, ----- 6. Bellwood, ----- 7. Duncansville, ----- | 59 14 5 9 0 0 0 | 87 |
| Clearfield, ----- | 1. Munson Station, ----- 2. Osceola Mills, ----- 3. Du Bois, ----- 4. Clearfield, ----- 5. Wallacetown, ----- 6. Houtzdale, ----- 7. Morrisdale, ----- 8. Winburn, ----- | 8 3 12 8 5 0 0 0 | 36 |

NOTE. No samples were taken in some towns, where indicated, from the fact that the feed found had been sampled.

TABULATED STATEMENT—Continued.

| Name of County Visited. | Name of Town or City Visited. | Number of samples taken in each town. | Number of samples taken in county. |
|-------------------------|--|--|---------------------------------------|
| Northumberland, ----- | 1. Sunbury, ----- | 16 | 48 |
| | 2. Shamokin, ----- | 5 | |
| | 3. Mt. Carmel, ----- | 5 | |
| | 4. Milton, ----- | 19 | |
| | 5. Watsontown, ----- | 3 | |
| Union, ----- | 1. Lewisburg, ----- | 11 | 13 |
| | 2. Mifflinburg, ----- | 2 | |
| Snyder, ----- | 1. Selinsgrove, ----- | 8 | 8 |
| Montour, ----- | 1. Danville, ----- | 17 | 17 |
| Columbia, ----- | 1. Bloomsburg, ----- | 11 | 24 |
| | 2. Catawissa, ----- | 8 | |
| | 3. Berwick, ----- | 5 | |
| Perry, ----- | 1. Marysville, ----- | 2 | 7 |
| | 2. Duncannon, ----- | 5 | |
| Luzerne, ----- | 1. Wilkes-Barre, ----- | 35 | 52 |
| | 2. Hazleton, ----- | 9 | |
| | 3. Nanticoke, ----- | 8 | |
| | 5. Edwardsville, ----- | 0 | |
| | 6. Kingston, ----- | 0 | |
| | 7. Luzerne, ----- | 0 | |
| | 8. Pittston, ----- | 0 | |
| | | | |
| Lackawanna, ----- | 1. Scranton, ----- | 28 | 28 |
| | 2. Dunmore, ----- | 0 | |
| Butler, ----- | 1. Butler, ----- | 20 | 28 |
| | 2. Harmony, ----- | 8 | |
| | 3. Zelenople, ----- | 0 | |
| | 4. Evans City, ----- | 0 | |
| Mercer, ----- | 1. Mercer, ----- | 7 | 24 |
| | 2. Greenville, ----- | 4 | |
| | 3. Sharon, ----- | 8 | |
| | 4. South Sharon, ----- | 3 | |
| | 5. Sharpsville, ----- | 2 | |
| Lawrence, ----- | 1. New Castle, ----- | 8 | 8 |
| Venango, ----- | 1. Oil City, ----- | 16 | 23 |
| | 2. Franklin, ----- | 3 | |
| | 3. Emlenton, ----- | 4 | |
| Forest, ----- | 1. Tionesta, ----- | 8 | 8 |
| Crawford, ----- | 1. Titusville, ----- | 8 | 8 |
| | 2. Utica, ----- | 0 | |
| | 3. Cochranton, ----- | 0 | |
| Erie, ----- | 1. Corry, ----- | 4 | 26 |
| | 2. Union City, ----- | 10 | |
| | 3. Erie, ----- | 12 | |
| Montgomery, ----- | 1. Pottstown, ----- | 18 | 23 |
| | 2. Pottstown, R. F. D. No. 1 (Sanatoga), ----- | 5 | |
| Delaware, ----- | 1. Chester, ----- | 12 | 12 |
| Philadelphia, ----- | 1. Philadelphia, ----- | 1 | 1 |
| Somerset, ----- | 1. Windber, ----- | 4 | 15 |
| | 2. Somerset, ----- | 10 | |
| | 3. Rockwood, ----- | 1 | |
| | 4. Plymouth, ----- | 0 | |

NOTE: No samples were taken in some towns, where indicated, from the fact that the feed found had been sampled.

I also hereby submit a table showing the places from which the samples were sent in, under that section of the law which says that any resident of Pennsylvania can forward to the Department a sample of feeding stuffs, enclosing a fee of one dollar for the analysis of the same. The said analysis shall be made within fifteen days upon receipt of sample at the Laboratory. This table will give you some idea of the interest that is taken by the purchasers of feed throughout the Commonwealth:

SPECIAL SAMPLES RECEIVED FOR ANALYSIS DURING THE YEAR 1910.

| Name of County. | Name of Town. | Number of samples received. | Number of samples received from each county. |
|-------------------|------------------------------|-----------------------------|--|
| Allegheny, ----- | 1. Pittsburg, ----- | 12 | |
| | 2. Allegheny, ----- | 1 | |
| | 3. Large, ----- | 1 | |
| | 4. Cheswick, ----- | 1 | 15 |
| Armstrong, ----- | 1. Apollo, ----- | 1 | 1 |
| Beaver, ----- | 1. New Brighton, ----- | 5 | 5 |
| Bedford, ----- | 1. Saxton, ----- | 1 | 1 |
| Berks, ----- | 1. Reading, ----- | 6 | |
| | 2. Kutztown, ----- | 4 | 10 |
| Blair, ----- | 1. Altoona, ----- | 5 | 5 |
| Bradford, ----- | 1. Rome, ----- | 1 | |
| | 2. Towanda, ----- | 2 | |
| | 3. Sayre, ----- | 1 | 1 |
| Bucks, ----- | 1. Benjamin, ----- | 1 | |
| | 2. Pipersville, ----- | 1 | |
| | 3. Newtown, ----- | 3 | |
| | 4. Quakertown, ----- | 1 | 6 |
| Butler, ----- | 1. Butler, ----- | 6 | 6 |
| Cambria, ----- | 1. Johnstown, ----- | 4 | 4 |
| Centre, ----- | 1. Center Hall, ----- | 1 | 1 |
| Chester, ----- | 1. Coatesville, ----- | 2 | |
| | 2. Chatham, ----- | 1 | |
| | 3. Lincoln University, ----- | 1 | |
| | 4. Malvern, ----- | 1 | |
| | 5. Parkesburg, ----- | 5 | |
| | 6. Phoenixville, ----- | 1 | |
| | 7. West Chester, ----- | 1 | 12 |
| Clearfield, ----- | 1. Coalport, ----- | 1 | |
| | 2. Du Bois, ----- | 1 | 2 |
| Columbia, ----- | 1. Berwick, ----- | 2 | |
| | 2. Fishing Creek, ----- | 1 | 3 |
| Crawford, ----- | 1. Meadville, ----- | 2 | 2 |
| Dauphin, ----- | 1. Harrisburg, ----- | 15 | |
| | 2. Highspire, ----- | 1 | 16 |
| Delaware, ----- | 1. Camp Ground, ----- | 1 | |
| | 2. Chester, ----- | 3 | |
| | 3. Sharon Hill, ----- | 1 | 5 |

SPECIAL SAMPLES RECEIVED FOR ANALYSIS DURING THE YEAR 1910.
—Continued.

| Name of County. | Name of Town. | Number of samples received. | Number of samples received from each county. |
|-----------------------|--------------------------|-----------------------------|--|
| Erie, ----- | 1. Erie, ----- | 2 | |
| | 2. Waterford, ----- | 1 | 3 |
| Franklin, ----- | 1. Chambersburg, ----- | 4 | 4 |
| Juniata, ----- | 1. Mifflin, ----- | 2 | |
| | 2. Port Royal, ----- | 1 | 3 |
| Lackawanna, ----- | 1. Scranton, ----- | 2 | 2 |
| Lancaster, ----- | 1. Christiana, ----- | 2 | |
| | 2. Columbia, ----- | 3 | |
| | 3. Drumore, ----- | 1 | |
| | 4. East End, ----- | 1 | |
| | 5. Elizabethtown, ----- | 4 | |
| | 6. Lancaster, ----- | 5 | |
| | 7. Lititz, ----- | 4 | |
| | 8. Manheim, ----- | 1 | |
| | 9. New Providence, ----- | 1 | |
| | 10. Quarryville, ----- | 1 | |
| | 11. Vintage, ----- | 1 | 24 |
| Lawrence, ----- | 1. New Castle, ----- | 1 | 1 |
| Lebanon, ----- | 1. Palmyra, ----- | 1 | 1 |
| Lehigh, ----- | 1. Allentown, ----- | 1 | 1 |
| Luzerne, ----- | 1. Wilkes-Barre, ----- | 6 | 6 |
| Lycoming, ----- | 1. Montoursville, ----- | 3 | 3 |
| Mifflin, ----- | 1. Lewistown, ----- | 1 | 1 |
| Monroe, ----- | 1. Pocono, ----- | 3 | 3 |
| Montgomery, ----- | 1. Collegeville, ----- | 1 | |
| | 2. Conshohocken, ----- | 1 | |
| | 3. Lansdale, ----- | 2 | |
| | 4. Linfield, ----- | 1 | |
| | 5. Narcessa, ----- | 1 | |
| | 6. Pottstown, ----- | 1 | |
| | 7. Schewnkville, ----- | 1 | 8 |
| Northampton, ----- | 1. Portland, ----- | 1 | 1 |
| Northumberland, ----- | 1. Shamokin, ----- | 1 | |
| | 2. Sunbury, ----- | 4 | 5 |
| Philadelphia, ----- | 1. Philadelphia, ----- | 47 | 47 |
| Potter, ----- | 1. Galton, ----- | 1 | 1 |
| Somerset, ----- | 1. Friedens, ----- | 1 | 1 |
| Susquehanna, ----- | 1. Herriek Center, ----- | 1 | |
| | 2. Lanesboro, ----- | 1 | |
| | 3. Montrose, ----- | 3 | 5 |
| Tioga, ----- | 1. Lawrenceville, ----- | 2 | |
| | 2. Wellsboro, ----- | 3 | 5 |
| Union, ----- | 1. Mifflinburg, ----- | 2 | 2 |
| Warren, ----- | 1. Sugargrove, ----- | 1 | 1 |
| Washington, ----- | 1. Canonsburg, ----- | 2 | |
| | 2. Elrama, ----- | 1 | 3 |

SPECIAL SAMPLES RECEIVED FOR ANALYSIS DURING THE YEAR 1910.
—Continued.

| Name of County. | Name of Town. | Number of samples received. | Number of samples received from each county. |
|---------------------|----------------------|-----------------------------|--|
| Wayne, | 1. Hawley, | 1 | 1 |
| Westmoreland, | 1. Gibsonton, | 2 | 2 |
| | 2. Greensburg, | 1 | |
| | 3. Manor, | 1 | |
| | 4. Scottsdale, | 1 | 5 |
| York, | 1. Brodbecks, | 1 | |
| | 2. York, | 1 | 2 |

We find upon the markets of Pennsylvania a number of brands of what is known as calf meal. This meal is compounded to be used in the raising of young calves where there is a scarcity of nature's feed of pure milk. The firms that are manufacturing these goods are making a legitimate feed, and we have failed to find any adulteration in the same, and in reports that have been received from farmers who are using the calf meals, we find that they are favorable to their use.

I here give a table which will give the analysis of three of the leading brands of this meal:

No. 1—

Protein, 27 per cent.
Fat, 5 per cent.
Fiber, 5 per cent.

Composition: Locust bean meal, wheat flour, flaxseed, cottonseed meal, beans, peas and lentils.

No. 2—

Protein, 27 per cent.
Fat, 7 per cent.
Fiber, 5 per cent.

Composition: Oat meal, barley, linseed and cottonseed meal.

No. 3—

Protein, 20 per cent.
Fat, 9 per cent.
Fiber, 3 per cent.

Composition: Oat meal, wheat meal, ground flaxseed and casein.

There is a large amount of chicken feed sold upon the markets of Pennsylvania. A few years ago they were not known in our markets, but at the present time there are thousand of tons sold. They are compounded by reputable manufacturers through the West and

by a number of firms in our own State. These feeds are sold to the consumer at an average of about $2\frac{1}{2}$ cents per pound. In some localities, they run a little less and in other sections, they retail at 3 cents per pound, or they retail at \$45 to \$60 per ton. I have prepared a table showing what these different ingredients would cost per hundred pounds.

| | |
|--------------------|--------|
| Wheat, | \$1.60 |
| Oats, | 1.20 |
| Buckwheat, | 1.20 |
| Barley, | 1.10 |
| Kaffir Corn, | 2.00 |
| Millet, | 2.10 |
| Corn, | 1.50 |
| <hr/> | |
| \$10.70 | |

Dividing this by the seven cereals of which it is composed, we find that they cost on an average of one dollar and fifty cents a hundred or $1\frac{1}{2}$ cents per pound or \$30 per ton. The cost of these cereals compared with that of the different scratch grains that we find shows a large profit to the mixer or compounder of the same. Of course, there is one reason that might be given for this difference in cost and that is the profit that must go to the wholesaler also the profit that must go to the jobber. This table consists of the price of the feeds as they are on the market today, but there is one way that the manufacturer of the scratch grains can reduce his mixture and that is by mixing wheat screenings with the same. The larger percentage of the scratch grains that are found upon the market are made up of wheat screenings. I am not condemning the scratch grain as a feed. I am only calling your attention to the difference in price between that which can be mixed by poultryman or farmer and those that are bought in the convenient way from the dealer.

A few years ago, the Department brought prosecution against a number of firms that were manufacturing chicken feed or scratch grain which contained a large percentage of weed seeds, but after our new law went into effect, these have been eliminated to a large extent and the chick feeds that have been found upon the market, with but few exceptions, comply with the Feeding Stuff Law of Pennsylvania.

There are a number of inquiries come to the Department in regard to condimentals that are found upon our markets. These condimentals known as invigorators and blood purifiers, are all sold on the market as feeds for domestic animals. In analyzing a number of these preparations, we find that they contain drugs that can be purchased in any drug store, and if our farmers and dairymen will secure Bulletin 175, pages 147, 148 and 149, they will find the formula or composition of these different condimentals.

I find that the farmers and poultry feeders are always more anxious to get something to feed in a convenient form, which they pay from 100 to 200 per cent. more for, than if they purchased the materials and compound it themselves. This seems to be the natural way of doing things at the present time. We would all sooner have other people to do this work in a wholesale way than to be bothered with it ourselves, but that is a matter for each individual to decide.

The question is often asked, What are distillers' and brewers' grains or by-products. I here give a definition of the same taken from Bulletin No. 175 for the year 1908. This may be of some information to those purchasing feeds, and as it is in a condensed form, it may be of more value than if a full definition were given.

DISTILLERY AND BREWERY BY-PRODUCTS.

Distillers' Grains

Analyses on pages 58 and 59, Bulletin No. 175.
1908.

Distillers' grains are obtained from the cereals in the manufacture of alcohol or whiskey. Usually corn and rye are used, but sometimes, we find that oats, wheat or barley are employed. Briefly, the process is as follows:

The grains are coarsely ground and treated with a malt solution which converts the starch into sugar. Yeast is then added, thus changing the sugar into alcohol, which can be distilled. The residue, consisting chiefly of the protein, germs and hulls of the grains used, is dried and sold as food for cattle. Distillers' dried grains, having all the starch removed, is consequently richer in protein and fat than the grains from which they are derived. These grains are considered valuable and economical food for dairy animals.

Three samples of corn distillers' grains were analyzed, showing an average of 33.69 per cent. of crude protein, 15.24 per cent. of crude fat and 12.17 per cent. of crude fiber. The collection also included one sample of rye distillers' grains which carried less than one-half as much crude protein than was found in corn distillers' grains. The sample also carried nearly three per cent. more crude fiber.

BREWERS' GRAINS.

Analyses on pages 58 and 59, Bulletin No. 175.

Brewers' grains are obtained from barley in the manufacture of malt liquors. The barley is first placed under conditions favorable to germination, and during this process, the starch is converted into sugar. The sprouts are removed and sold as cattle food while the malted grains are crushed, the sugar is extracted, and the residue is dried and placed upon the market as brewers' dried grains. Distillers' and brewers' grains are fairly digestible. Four samples were analyzed during 1908 and the average results appear in the following table:

AVERAGE ANALYSES AND RETAIL PRICES.

| | | | | |
|--------------------------|---------|---------|---------|---------|
| Number of samples, | 1 | 1 | 6 | 4 |
| Crude protein, | 28.50 | 22.50 | 26.34 | 28.19 |
| Crude fat, | 7.27 | 6.93 | 7.30 | 7.43 |
| Crude fiber, | | | 13.25 | 14.13 |
| Price, per ton, | \$20.00 | \$23.00 | \$22.80 | \$28.25 |

The number of violations of the Feeding Stuff Law was sixty. We have secured convictions in all of these cases but one, and that case has been appealed to court and will be tried at the March term in the Centre County Court. In the hearings of these cases before the courts, there never has come up a question in the argument of the attorneys for the defense in regard to the constitutionality of the law, and I am led to believe, from the information I received from the attorneys, that our law is a good one and well drawn. The Secretary has been very anxious that our law should not be the means of prosecution, that we should endeavor to educate and inform the manufacturers of concentrated feeds of the meaning of the law and have them comply with the law without bringing more prosecutions than is necessary. The men who are engaged in the sale of feeds throughout Pennsylvania are reputable citizens, engaged in legitimate business, and our experience with them is that they are anxious to handle pure feed and give their customers a fair return for their money.

I would like to call your attention to one instance where a large firm in the West, that for years handled large quantities of mixed feeds, that have placed upon the market feed running very high in protein, high in fat and low in fiber, and they are endeavoring to have their customers buy this feed. They claim that it is more profitable to buy a feed high in protein and fat and low in fiber than to buy the low grade feeds that were formerly on the market.

There is another section of this law that we are pleased to state the manufacturers or importers of feeding stuffs are complying with, and that is, that upon the request of the Department they shall file a registration, giving the analysis and composition of their feeds. We have received 378 registrations for the sale of commercial feeds in Pennsylvania, representing over 1200 brands. Many brands were alike in their composition, such as wheat by-products, distillers' and brewers' by-products and whole grain feeds.

OUR NEEDS.

I would like to call your attention to some of our needs for the proper enforcement of this law. The work has so grown and the large number of feed products placed upon our markets has become enormous, and it is impossible for one sampling agent to visit all the feeding stuff stores in Pennsylvania once a year, and we find that a visit should be made at least twice a year to each dealer, if possible. Therefore, we need money to employ one more sampling agent.

We also need in the office one clerk who should be a stenographer and also able to keep books, as each sample that is taken by the agent means just a given amount of work in the office. There must be records kept of these samples, and after they are analyzed, reports of the analysis must be made to the Secretary, to the dealer,

to the manufacturer, and one to be kept on file in the office. Thus you will see that 2,000 samples taken, means eight to ten thousand reports to be made of each sample. We also sent out 6500 bulletins and a large number of copies of the law. This all requires clerical work besides the thousands of letters that come to the Department requiring answers. We have grown from a very small beginning to a Bureau of no small means. I have endeavored in the short space of time that has been allotted to me, to call your attention to some of the most important things connected with our work.

We have here at the meeting samples of the different feeds that we find on the markets of Pennsylvania, as well as samples of the adulterants. You will find a gentleman in charge of the same, and we will be pleased to give you any information that it is in our power to give. The Laboratory is situated on the fifth floor of the Capitol Building, and you will find those in charge delighted to give you any information that they can.

As the General Agent of the Department of Agriculture, I wish to return thanks to Secretary Critchfield for his courtesy and kindness to me and for the confidence that he has reposed in me in carrying out his work.

I also wish to thank the Chief Chemist, Mr. James W. Kellogg, for his kindness and for the able manner in which he has had conducted the laboratory work, and to Mr. John F. St. Clair, the Special Agent, for the care and courteous manner which he has met the dealers throughout the State of Pennsylvania.

Any information that I can give to any member of this Board or any farmer in Pennsylvania, in regard to commercial feeds, I will be delighted to do it. You will find our bulletin covering the work of 1909, one of the best published in the United States.

MR. HUTCHISON: The most important statement in my report is: "I am still advocating the doctrine that all feeds should be sold on their protein and fat value, and their low fiber constituency, or the higher the protein and fat and the lower the crude fiber the more valuable the feed." If you get nothing else out of my report, I would like you to make that statement.

A Member: I would like to know the analysis of corn silage.

MR. HUTCHISON: 1.07 per cent of protein, .80 per cent of fat and 6 per cent. of crude fiber. It is low, as you see, in protein, and low in fat, but the great value of the ensilage is that in the green state it makes a stimulating food in the winter. Of course, lots of good feeders add some high protein feed with the ensilage to bring it up. Is there any other analysis that you would like to have?

A Member: Let us have the alfalfa, please.

MR. HUTCHISON: The alfalfa hay meal is 14.3 per cent. of protein—some will run a little higher than that; crude fat, 2.20 per cent. Now there is a difference in the fiber of alfalfa running according to the large stems which you will find in the plants; some of it runs a little higher and some lower, but the average is about 25 per cent. of fiber.

A Member: Please compare the wheat bran right there.

MR. HUTCHISON: Wheat bran is fifteen, that is a little higher, in round numbers, in protein; 4 per cent. of crude fat compared with 2.20 per cent; and nine per cent. of fiber. The wheat bran has less fiber than the alfalfa. The report that I get from the men who manufacture the alfalfa meal is that we have to add corn or something with it to bring it up. Just feeding alfalfa alone the dairymen don't get the best results.

MR. J. A. HERR: Mr. Chairman, I move that the report be received and placed on file for publication with the proceedings of the Board.

The motion was seconded and agreed to.

The CHAIRMAN: Is there any further discussion on either of the reports read this morning.

MR. GLOVER: I would like to ask a question in regard to roads, for information. Whether the roads that were contracted for two or three years ago will probably be completed now? Up in our county of Union there was a road started from Mifflin to Lewisburg, a distance of about nine miles, and after they had built about three miles the work stopped. Our people would like to know whether this road will be completed now. The contractor seems ready to go on with the work, but there appears to be a hitch somewhere here at the Highway Department.

The CHAIRMAN: Is there any one here who can answer that question? Perhaps no one but the Highway Commissioner can answer it.

MR. HUTCHISON: We have had the same experience, and hundreds and hundreds of others have had it throughout the Commonwealth. The appropriation of money made was not large enough to complete this work. Now our county has a peculiar condition. We have surveys made for four and a half miles of road out of Tyrone through our valley. The survey was made, it passed our County Commissioners, and passed up to the high officials, and we thought we were going to drive on a State road, but our good brothers in Huntingdon, under the little amendment that was put into the State law afterwards saying that boroughs could get the appropriation to build roads, came down here and put us in a hole, and Huntingdon borough got the forty-four thousand dollars to build roads in Huntingdon borough for farmers to hitch their horses on, and gentlemen to run their automobiles on, and that has been a great detriment to the good road laws of Pennsylvania. I just think it is something we should consider and think about, and if the new road law comes here let us see that it provides that the boroughs shall build their own streets. When these two fellows built the roads they don't even leave the hitching posts up for the farmers to tie their horses on. This has been a detriment to getting money to build roads, and that is why ours is not completed. I would like to go on record here as a member of this Board, and one interested in the farmers of Pennsylvania, against the boroughs getting the money that should go to the farmers to build roads.

The CHAIRMAN: Are there any other questions on the subject gone over? We want to have the discussions now. We have some time for this.

MR. WITTMAN: I might add another thing to what Mr. Hutchison says in his report. He says something about people paying too much for scratch feed for chickens. They are also loosing a lot of money, because the grains used generally in making up these compound feeds are shrivelled up and far from being first class grains, and people paying more than the prices of the good grain are paying too much for this inferior stuff. The hens cannot lay eggs on stuff like that. It is all husks and fiber. The analysis shows that it is not a good feed to get results. I ran across a man who was feeding this commercial feed and he says you see the way I am feeding, and they will not lay. That fellow had a half an inch of that feed in the pen. It was all waste stuff. They would not eat it. They could not lay eggs. It was up to me and I told him to buy the grains himself and get the best, and feed that, and in a few weeks he was getting lots of eggs. He had been feeding this other feed for two months and getting nothing, and besides was paying too much for his wisdom.

MR. HUTCHISON: A little discussion of that scratch grain now may save some money.

The SECRETARY: I should be very glad if it would be scratched clear.

MR. WITTMAN: Mr. Hutchison does not make it strong enough. He says there are thousands of tons sold in Pennsylvania, where ten years ago there were practically none. That is not big enough. There are thousands of tons sold in southeastern Pennsylvania. It is almost universally used. People don't seem to know of anything else because it is handy and ready mixed. The farmer seems to think it is too much trouble to mix his own feed.

In one way the law is wrong. On the other hand, I send to St. Louis and buy a particular brand of chicken feed just because it contains a lot of weed seeds. My chickens are weed seed hungry all winter and I get more eggs because I feed weed seeds. You take the droppings and mix them up and pour on blotting paper, and examine them and see what happens. These weed seeds are just ground up fine. They don't do any harm. My hen manure does not give me any weeds on my lawn.

MR. HUTCHISON: Go on and state that the chicken and sheep are the only two animals that have the means of grinding up these weed seeds.

MR. WITTMAN: That is what the Vermont Station says. The chicken that has plenty of grit grinds up all of the weed seeds.

A Member: Why do you buy that weed seeds?

MR. WITTMAN: It is a cheap feed I am buying. I buy it because the man does not make any secret that it does contain a lot of weed seeds, and because my chickens like it and it is good, and they are hungry for it all winter long.

The SECRETARY: You are not selling any of it?

MR. WITTMAN: No; I am buying it all winter long. I think the law is wrong in that respect. I think weed seeds ought to be allowed in chicken feed.

MR. HUTCHISON: Will they eat cockel?

MR. WITTMAN: No, there are three weed seeds they won't eat.

A Member: What are the cheap feeds that chickens would eat?

MR. WITTMAN: Low grade of oats, a poor grade of barley, three or four kinds of wheat, screenings, just simply a lot of husk and fiber and poor cheap buckwheat. It is the poorest kind of grain that is what it is.

A Member: Some of the wheat in our county is smutty. How would that do to feed chickens?

MR. WITTMAN: They would pick out the good wheat first. When forced they will eat the others and it causes a lot of damage.

MR. HUTCHISON: I am glad Brother Wittman came up on that. Now, under the Secretary's ruling, screenings are the small grains or broken grains of wheat, rye, buckwheat and things of that kind, that are not wheat seeds. He has been buying small grains of wheat and oats, and small grains of other cereals. That part is all right but now he is buying up weed seeds on the market. He is buying a large amount of cockel that they will not eat. There are other weed seeds that the chicken can assimilate. They are high in protein, though bitter, yet they like them when ground up as they grind them they get the benefit, that is the two domestic animals mentioned. I was talking on the cheapness of the feed and the fraud the man is paying for. That is what I was bearing down on. I am glad to have this discussion. That is what will sharpen us on that line.

I would like you to say something about this calf meal. Have you any experience on that? Let us have somebody talk on this and get something out of it. Unless there is something else to come up I would like to hear something on this subject. This calf feed is a new thing to me. I have had trouble more or less with calves and have given them milk for a long time, and this is a new feed to me entirely.

My experience is that the best grain, that weighs the most is the cheapest and will pay. The warehouse people are asking seventy-five cents for common screenings. You cannot afford to pay that for it when good wheat is only ninety cents a bushel. I am sure there is not over sixty per cent. of food value in the screenings compared with good wheat, so I say the best grain is the cheapest.

A Member: Mr. Chairman, I have in the past eight years fed calf meal at different times, and I have always found it a very good help when milk was short. It does well, the calves thrive.

On the road question I want to say that in our county we had some years ago, when the State was assisting the county to build some roads, a number of pieces of state road built, and considering

the wear and tear that has been on them since that time, without any repairs, we think they were good roads; but having had no effect in all that time we think it would be a great pity for the state to let them go to destruction now. They need repairing now.

A Member: Mr. President that brings to mind this fact, that we have had a state road in my county for four years, and only two years ago and the last summer the supervisors had to go over the road and put on a fine coating of crushed stone to keep it in order. The matter of keeping up the public roads is a burden after they are built, and if this state board would take some action whereby the state looks after the maintenance of these roads besides the building it will be a good help.

The SECRETARY: I want to suggest that after a while we will have a Committee on Resolutions, and if any gentleman thinks of any legislation that he believes would be profitable and beneficial to agriculture, and will prepare the resolution and hand it to the Committee on Resolutions, and the Committee report favorably on it, they can go to the Legislative Committee of the State Grange as well as to the Committee on Agriculture of the House of Representatives and Senate. That will be a good way to get it started. I make this simply as a suggestion. The Legislative Committee of the State Grange is in session in this city now. If the resolution is presented to the committee the regular or appointed Committee on Resolutions of this Board and is adopted by the Board, and a copy sent to the Agricultural Committee of the House of Representatives and Senate, also to the State Grange, it certainly will stand a very good chance to get before the Legislature.

The CHAIRMAN: If you have any resolutions on legislation please hand them to the Legislative Committee as it will have a session at 4:30 this afternoon.

The Legislative Committee consists of H. G. McGowan, A. J. Kahler, Matthew Rodgers, S. S. Blyholder and E. B. Dorsett.

MR. HUTCHISON: I wish to state on the subject of calf meal that there are several brands on the market. We have the composition of three of them in our bulletin. You will find full directions how to feed on the package. It is a high concentrate. In preparing it for use mix it with a little milk to start with, and as you gradually get to feeding a little more mix it with water, and after a while you will get to feeding it without milk. You can scald it before you mix it. Scald in the morning that which you are going to feed in the evening. You can get full directions for feeding on each package. I have had experience in growing one calf with it. It is a feed that is very high in protein. This calf is growing very rapidly, it is not yet a yearling and is as large as any I have. I am not advertising this feed, I am just telling you one of the things that is on the market. There is no adulterant used in the making of this feed; it is pure.

A Member: We had a Jersey calf that we did not want to raise and we could not sell it to anybody, and we determined to feed it for the butcher without letting it suck the cow. By the use of the meal we sold it at four weeks old to the huckster for eight dollars.

A Member: I was struck with one thing in the statement of Mr. Hutchison, and that was this: The diverting of the funds on the building of boulevards in the boroughs and cities. I want to call attention to the fact that the same thing is working in our schools against the rural population. The schools of the towns are being built up and made first-class while the schools of the rural districts are neglected and robbed of the funds that should come to them but which are being used to support the schools of the boroughs and cities.

A Member: I want to add that there will come before the Legislature a bill called the School Code, one of which went through the Legislature two years ago, and very fortunately was set aside by Governor Stuart. This one goes considerably further in some respects than that one. It adds quite a number of things to the curriculum. I have been a school director off and on more or less for twenty years, and I feel thoroughly satisfied that should such a thing become a law the farmers of Pennsylvania will find themselves very much embarrassed. I find further and I think there are a great many other farmers in this state that will agree with me, that we have now longer school terms than the people in the country can comfortably take care of; and they easily agree with me now that we have as much curriculum as our children can handle, and that the only thing that we need now is better teachers if we can get them.

The CHAIRMAN: Any further remarks? If there is anything on that particular subject very urgent, put it in writing and present it to the Legislative Committee, because there are certain conditions in that that will come up in the regular work of that Committee.

If there are no other remarks on that subject, what action will you take on the Report of Brother Hutchison?

A Member: Mr. Chairman, I move that it be received and placed on file for publication with the proceedings of the Board.

The motion was agreed to.

The CHAIRMAN: The further order is New Business and Unfinished Business. We will take up the Unfinished Business first.

The SECRETARY: I know of none, Mr. Chairman.

MR. HERR: I would suggest that under the head of New Business we fix the time and place of our summer meeting. That is one item under the head of new business.

MR. HUTCHISON: I think the Committee on Credentials should report first, because each one of those gentlemen would be entitled to a vote. Could we not have a partial report of the Committee on Credentials.

MR. HERR: We are all members of the Board of Agriculture until the day fixed for the admission of new members and that will be tomorrow. Therefore, I guess my motion would be out of order.

The SECRETARY: I think we had better wait for the Report of the Committee on Credentials until tomorrow, when the new members can be received. The report could be received now so far as delegates are concerned, but not as to members of the Board.

Mr. HUTCHISON: Is that the decision of the Secretary or the law?

The SECRETARY: I do not know that the Secretary has the right to rule upon that question, but certainly the old members that are present, whose term expires with this year, have a right to act until their places have been filled by the incoming members. We are in session today, just as we were last year, and there can be no new organization or new work done that pertains particularly to the newly constituted Board until after the election tomorrow. That day is fixed by Act of Assembly.

The CHAIRMAN: The report of the Committee on Credentials being received does not necessarily seat the members until tomorrow at the proper time.

I think it is proper to have a Committee on Resolutions appointed at this time, will somebody make a motion to that effect.

A Member: Mr. Chairman, I move that five members of the Board be appointed as a Committee on Resolutions.

The motion was seconded, put and agreed to.

The CHAIR: As a Committee on Resolutions the Chair appoints Messrs. F. D. Kerrick, Bradford County; J. A. Herr, Clinton County; Sylvester Shaffer, Lawrence County; W. E. Perham, Wayne County, and M. P. Shoemaker, Westmoreland County.

MR. HUTCHISON: Mr. Chairman, I move that a Committee of three be appointed to wait upon the Governor.

The motion was seconded, put and agreed to.

The CHAIRMAN: The Chair appoints Messrs. Sylvester Shaffer, A. P. Young and J. H. Wilson as a Committee to wait upon the Governor and inform him that the Board is in session, and invite him to meet this convention.

The CHAIRMAN: Anything further under New Business, gentlemen?

MR. HUTCHISON: I would suggest that the Governor be waited upon as early as possible so that he may be able to arrange his matters to be with us this afternoon. If possible it would be excellent to wait upon the Governor this forenoon.

The SECRETARY: Permit me to say that possibly the members would be very glad to have the opportunity to go over to Johnston's Hall and look at the exhibits a little while before dinner. The Committee has gone to a good deal of expense in gathering and placing these exhibits, and we might take this opportunity of going over there and looking them over.

MR. CLARK: I just came from the building, and it is almost impossible to finish the arrangement of the exhibits with the crowd in the house.

MR. HUTCHISON: Why not ask Mr. Knuppenburg to report now?

The SECRETARY: He is not to be found.

The CHAIRMAN: We will now have the Report of the Committee on Credentials, if they are ready to report.

MATTHEW RODGERS (Chairman of the Committee on Credentials): Mr. Chairman, the Committee are only prepared to submit a partial report, as follows:

REPORT OF THE COMMITTEE ON CREDENTIALS

To the Officers and Members of the Pennsylvania State Board of Agriculture:

We, your committee, do find that the following named persons have been duly elected members of your organization from the counties herein set forth:

John P. Young, Franklin County.
 J. N. Glover, Union County.
 J. A. Herr, Clinton County.
 E. J. Durnall, Delaware County.
 D. S. Taylor, Washington County.
 G. F. Barnes, York County.
 Dr. W. Frank Beck, Blair County.
 W. H. Milliron, Butler County.
 J. Aldus Herr, Lancaster County.
 I. A. Eschbach, Northumberland County.
 W. C. Black, Mercer County.
 B. Frank Wambold, Bucks County.
 R. J. Weld, Warren County.
 Edward S. Keiper, Dauphin County.
 S. S. Blyholder, Armstrong County.
 J. H. Schultz, Montgomery County.
 John C. Weller, Somerset.

The credentials of C. H. Dewitt, of Tioga County, are held for further consideration.

The Lebanon County Agricultural and Horticultural Association have elected the following delegates to this meeting:

Clark G. Long, Jonestown, Pa.
 E. Shuey, Lickdale, Pa.
 J. H. Brubaker, Lebanon No. 10.
 Albert Barnhart, Annville.
 F. R. Fertig, Lebanon, Pa.
 E. S. Risser, Lawn, Pa.
 J. H. Bennetch, Newmanstown, No. 1.
 J. K. Dierwechter, Richland, Pa.
 L. E. Bucher, Myerstown, Pa.
 S. P. Heilman, M. D., Heilman Dale, Pa.

The Juniata County Agricultural Society have elected the following delegates to this meeting:

C. C. Mertz, Thompsontown, Pa.
 Stuart A. Robinson, Port Royal, Pa.
 James N. Groninger, Port Royal, Pa.

The Clarion County Fair Association has elected the following delegate to this meeting:

Peter Wingerd.

The Adams County Agricultural Association have elected the following delegate to this meeting:

W. W. Boyer.

MATTHEW RODGERS, Chairman.
PETER GEARHART, Secretary.
E. R. WARBURTON,
M. M. NAGINEY,
D. A. KNUPPENBURG.

The CHAIRMAN: What action will you take on the Report of the Committee on Credentials?

A Member: I would like to know whether the report of the Committee recommends that these gentlemen shall be enrolled as members of the Board at the proper hour tomorrow.

MR. HERR: I move that the delegates that were sent here be received as delegates and be allowed the privilege of the floor.

The motion was seconded, put and agreed to.

A Member: I would move that there be added to these members the Master of the Lackawanna County Grange, Mr. J. W. Ross.

The motion was seconded, put and agreed to.

The CHAIRMAN: What action will you take on the recommendation that the members be received?

A Member: I move that action on the members be deferred until tomorrow at the proper time.

A Member: What is the proper time tomorrow?

MR. HERR: Any time Wednesday. Wednesday is the day—any hour. I think their terms commence tomorrow, according to law.

The motion was seconded, put and agreed to, to postpone action on the election of members until tomorrow.

The CHAIRMAN: I think that the Chairman is ready to entertain a motion that visitors who are not regularly appointed by any society shall have the privilege of entering into the discussions. The Chair is ready to entertain a motion of that kind.

A Member: I move you that visitors be received and be given the privilege of the floor as others to take part in the discussion.

The motion was seconded, put and agreed to.

The SECRETARY: Mr. Chairman, I believe there are and will be a number of visitors here who will take part in the discussion and help our work along and I would be very glad if such visitors will send their names to the desk in order that they may be entered upon our minutes. The invitation now is extended to any organizations of a kindred character and these persons will have the privileges

of the floor. I would be very glad to know who accepts the invitation. So I will be very glad, Mr. Chairman, if they will just send their names to the Chair, or come up here and give their names to me.

A Member: The new members will have no say until tomorrow, until after their election?

MR. HUTCHISON: I move that these members be given the privilege of the floor in all deliberations except to vote.

The motion was seconded, put and agreed to.

The following visitors were then enrolled:

Ernest F. Pierce, York, Pa.
 E. C. Bowers, East Petersburg, Pa.
 J. S. Briggs, Norristown, Pa.
 M. E. Shay, Holmesburg, Pa.
 Harry Baker, Lake Carey, Pa.
 A. O. Finn, Clifford, Susquehanna County, Pa.
 Hon. H. R. Brunges, Tunkhannock, Pa.
 W. H. Bullock, Honesdale, Pa.
 John Henning, Mehoopany, Pa.
 W. J. Lewis, Pittston, Pa.
 H. W. Sweigert, Mifflin County.
 J. W. Yoder, Mifflin County.
 W. J. McFarland, Mifflin County.
 Charles McNeely, Juniata County.
 W. A. McMeen, Juniata County.
 Samuel Foust, Montgomery County.
 A. J. Hummer, Schuylkill County.
 Jerry Hoffner, Schuylkill County.
 John Shrop, Schuylkill County.
 J. W. Ross, Master of Lackawanna County Grange.
 J. D. Frederick.
 W. S. Ross.
 C. W. Shaw.
 A. B. Brodbeck.
 W. H. Patterson, Columbia County.
 H. M. Shaley, Union County.
 R. N. Atwater, Delaware County.
 Elmer E. Beck.
 E. D. Swartz, Schuylkill.
 James T. S. Way.
 Howard Kerrick, Bradford County.
 John T. Bashing, Adams County.
 George K. Hartman, Adams County.
 Ephraim Shelley, Adams County.
 M. M. Clark, Westmoreland County.
 Morris Swartwood.
 W. H. Stoud.
 John C. Miller, Union County.
 Alvin Dewitt, Adams County.
 C. G. Atwater, York County.
 J. Kerr Lott, Adams County.
 Francis J. McKanna, Westmoreland County.

MR. HUTCHISON: Mr. Chairman, I move that we now adjourn until 1:30 o'clock this afternoon.

The motion was agreed to.

Tuesday Afternoon, January 4, 1911, 1:30 P. M.

Vice President J. C. Weller in the Chair.

The CHAIRMAN: The meeting will come to order. We will now have the report of the Committee on Fruit and Fruit Culture, by D. A. Knuppenburg, Chairman, Lake Carey, Penna.

Mr. Knuppenburg then presented his report as follows:

REPORT OF THE COMMITTEE ON FRUIT AND FRUIT CULTURE

By D. A. KNUPPENBURG, *Chairman*.

The year that has so recently slipped out of the arena witnessed a decided march forward in many directions. Looking back over the record and weighing the importance of the different lines of progress, we naturally place at first, the phenomenal development in Agriculture. In the light of past events, I confidently believe that if the year 1911 sees advancement correspondingly as great as that of 1910 there will have been accomplished most marvelous results. In the march of progress those things that most closely concern the home, is the movement to make farm life more attractive and remunerative; the strong interest manifested in civic improvement and the increasing demand that the public schools shall furnish an all-around education that fits our children for active, honorable and self-reliant life. All these and many other forward movements are good, and should enlist the interest and support of every right-minded person. The Department of Agriculture is to be congratulated on the changes that have been wrought along this line; but we are only standing on the threshold of what must be accomplished. This is not a result of second-hand information but a matter of absolute personal knowledge.

The people of the State of Pennsylvania have not fully realized the vastness and importance of the wonderful resources before them. Fruit growing *has* been profitable where near markets, but little has been done toward bringing the people to properly understand the great possibilities within their reach. However, we are prepared to report rapid progress. In proof of this, I wish to call attention to the display of fruits at Horticultural meetings, fairs, institutes, orchard meetings and Grange meetings, which speak in terms too plain to be misunderstood of the advancement of fruit growing in Pennsylvania. It has been fairly demonstrated that a great percent. of our cheap lands are admirably adapted to the growing of fruits if intelligent and up-to-date methods are used. New acres have been uppermost in the minds of the husbandman. They as yet have scarcely begun to utilize them as they may and *will* in future

years. Fruit trees respond beyond the belief of the ordinary person even on what is called worn-out land. The roots penetrate deeper and feed on the fertility stored beyond the reach of the ordinary field crop. Fruit trees put on rapid growth if properly cultivated, fertilized and pruned, and the ever present insect pests held in check by use of improved spray methods, all of which must be followed up intelligently.

The State is doing a great work in bringing the people to understand and practice the new way of growing trees, gathering, packing and marketing fruit. In the model and supervision orchard work now carried on by the State through the Bureau of Zoology, the people are taught to select a proper site; next to prepare the soil for the planting; also how and where to buy stock, how to select varieties best adapted to each locality, how to plant, prune and fertilize; to know dangerous insect pests and how to suppress them. Among the most destructive of these are the San Jose scale, borers, codling moth, curculio, aphides, oyster shell scale, scurfy scale, Putnam scale and the caterpillars. Next comes the fungus diseases, blights, mildews, rusts and rots. Pennsylvania lost one million dollars in 1910 from the ravages of codling moth alone. We see apple, pear, peach, plum, cherry, blackberry, raspberry, gooseberry, strawberry and many other small fruits all in their natural state growing wild. What better proof can we look for as to the adaptability of Pennsylvania to fruit and fruit growing?

What would we think to see a lumbering railroad train with an ancient wood burning engine and a man between each car twisting away at a cast iron break wheel, trying to manage the railroad business of today? This would be just as much in keeping with the times as to see people trying to grow fruit under the system that prevailed fifty years ago. As our young men and women become educated, the farm home is left to the renter, and soon dissolution reigns. The work now in progress by the State of carrying practical information direct to the rural districts, is working out the problem to satisfaction. That is just what is happening on many farms in Pennsylvania.

The bounteous crops of fruit harvested where improved methods have been applied proves beyond a doubt that there still remains in Pennsylvania soil greater wealth than has ever yet been brought out. Thousands of people are encouraged and starting back to occupy the homes once left to the owls. Over 1100 orchards have been treated for insect pests with very marked results; seventy-five per cent. more fruit trees now growing in Pennsylvania than three years previous. Peach comes in profitable bearing the fourth year, apple four to eight years. Jonathan apple has given three bushels per tree the sixth year.

The fruit crop of Pennsylvania in 1910 was not large, and good prices prevailed; prices of apples last fall ranged from seventy-five cents to one dollar and a quarter per bushel. Peaches from sixty cents to one dollar and a half a basket. The kinds of apples most favored for planting are principally, Northern Spy, Baldwin, Rhode Island Greening, Stayman Winesap, Grimes' Golden, York Imperial, Winter Banana, Stark, Delicious and Jonathan. There is a growing demand for currants and gooseberries and a ready market for small fruits. The market calls for quality. The small things of earth confound the wise, and still there is room.

The CHAIRMAN: You have heard the report. What action will you take upon it?

MR. BLYHOLDER: I move that it be received and placed on file for publication with the proceedings of the Board.

The motion was agreed to.

The CHAIRMAN: The next on the program is the Report on Forests and Forestry, by Robert Conklin, Harrisburg, Penna.

The SECRETARY: Mr. Chairman, Mr. Conklin will not be able to be present at this afternoon's session, but he has sent as his substitute Mr. Robert E. Rupp, who belongs to his Department.

The CHAIRMAN: We will be pleased to hear from Mr. Rupp.

Mr. Rupp then presented the report as follows:

REPORT ON FORESTS AND FORESTRY

By ROBERT CONKLIN, *Harrisburg, Pa.*

It is the duty of a government to perpetuate itself, and in perpetuating itself there is a further duty to provide for the common welfare of its citizens. With these objects in view, it is wise for a state to see to it that every square foot of soil, the source of wealth, be made to produce its highest revenue. Whenever elements of production are allowed to be wasted, the whole moral fiber of those in connection with the waste is lowered and general dissatisfaction follows. The state in turn suffers from undesirable citizens, loss of industry, income, and at the same time outlay for remedial measures, and a host of economic conditions which can hardly be followed.

Pennsylvania stands high in the list of states, agriculturally, and we are all proud of her record, but as long as it remains true that at least 8,000,000 acres of productive soil are not paying interest on a low investment in them, to say nothing of taxes, and other millions of acres are not producing more than half of what they are capable, we can still bow our heads in shame and think on the matter seriously. When we grasp the enormity of this blot on our records we should be stirred to redoubled efforts to put Pennsylvania where she belongs—not high in the list, but the Keystone of the Arch.

The fact is sometimes overlooked that trees grow on soil and that a wood crop is just as truly a crop as a crop of wheat. It is this fact that I want to recall to your minds today. Trees will grow on soil which is too rocky or too poor to grow any agricultural crop, because only a very small percentage of their make-up is taken from the soil. But it is also true that some trees will grow much more rapidly on moderately good soil than they will on poor soil. They will grow on hillsides too steep to farm, where erosion is taking place or is hard to prevent, along streams, roads and in undesirable corners. They require practically no attention after planting and are all the time growing into value financially and otherwise.

Fifty years ago a farmer in Eastern Pennsylvania planted Norway spruce and European larch along his fence rows. Today the trees alone are worth almost as much as his farm, and yet they have taken nothing from his annual crops, but rather increased them by reducing evaporation over the fields. At least 4,000,000 acres of cleared farm land in Pennsylvania are fit only for growing trees. Why are they not being planted? Simply because the farmers do not know how, what or when to plant and the returns which may be had from planting. Education must be the keynote of our activity. The present schemes must be intensified, new schemes must be devised, and every means used which will bring economic farm education to every farmer and his family.

There must be more co-operation on the part of the Departments concerned—principally those of Education, Agriculture, and Forestry. School gardens, elementary agriculture, agricultural clubs, Arbor Day, and so on must be gotten into the schools. The school buildings should be the social centers of the communities, and if necessary, the Government must send out social settlement workers. Agriculture and forestry must no longer be left out of county and local teachers' institutes, nor should a consideration of the schools and forestry be left out of farmers' institutes. There are no forestry institutes, but lectures, bulletins, sample plantings and all manner of assistance must be provided for. It behooves every member of our Departments to make each appropriation reach as far as possible, but it is more important that results are obtained from what is done, and then the results themselves must and will speak for increased assistance from the Legislature.

During the past year the activities of the Department of Forestry advanced steadily both along established lines and along new lines. There have been added to the reserve area 17,000 acres, making the total area of reserves now owned by the State 933,582 acres. There are thirty-nine trained foresters and eighty-five rangers in charge of this large area, using every means available to develop it as rapidly as possible and to bring it up to the best economic production.

The importance of protection, especially from fires, is appreciated, but only a small part of a perfect system of protection could be carried out. The survey, opening and marking of boundaries has been continued. Over 1000 miles of roads or trails have been opened this year, making possible the better management of the reserves, and at the same time making them more accessible to the citizens of the State. Old material which would otherwise become fuel for fires or a hindrance to young growth has been gathered and sold at a profit. A number of fire observatory towers have been built and should now be connected with the foresters' headquarters by telephone. Improvement cuttings have been made and some old and decaying trees manufactured into lumber, the object in all cases being to make room for good, sound, young growth yielding a high rate of interest instead of that which is decreasing in value.

About 1½ millions of forest tree seedlings have been planted this year on the reserves and several hundred thousand more were raised in the nurseries and sold at cost to people of the State. In addition to this, the Department gave assistance to many individuals who wanted to make plantations by making planting plans for them and then superintending the planting itself. In the nurseries of the re-

serves there are over 5,000,000 seedlings, and the area and production of our nurseries are being increased as rapidly as possible. The Department aims at a planting record of 20,000,000 seedlings a year on State holdings alone, and that is none too few.

The reserves have been open to the public as recreation grounds and during the year 3,556 persons have obtained camping permits, these being required when it becomes necessary to build fires for cooking. The camps have been distributed in 22 different counties. There is absolutely no restriction in the matter of hunting and fishing on the Reserves, except what the game laws impose. The Department wants the people of the State to use the Reserves to their fullest extent, only asking that no needless damage be done to trees and birds, no game laws violated, and no fires built without permission. In addition to those obtaining permits, at least 10,000 persons have used the Reserves for hunting, fishing, or a day's outing not, however, including the thousands of people who frequently visit Mont Alto and Caledonia Parks on the South Mountain Reserve. We have no notion of the number of people who go upon the Reserves annually for berries nor of the value of the crop which they harvest.

The Forest Academy at Mont Alto graduated eight young men in August who are now in the State Forest Service. The work is being strengthened each year and the State can be proud of the young men who have been graduated from there and of the work they are doing on the State Reserves and in the localities where they have been stationed.

Assistance was given in the eastern part of the State toward studying and attacking the Chestnut Tree Blight, and in the western part of the State in an examination of the Ohio watershed with reference to forest conditions, erosion, storage of water, prevention of floods, etc.

We have also been able to give practical assistance to all who have applied with reference to the matter of handling their wooded areas. Our Forest Inspector goes over the ground in each case and formulates a plan suited to the conditions as nearly as can be determined in the time available. It is the aim of the Department to be of as great service to the people of the State as it is possible to be. Our offices are becoming a store-house of information on all lines concerning forests and forest trees, and that information is for the use of the public.

MR. RUPP: Mr. Chairman, I stand ready to answer any questions that the gentlemen here may ask regarding the forestry problems of the State at the present time.

A Member: Have you any forest reserves on the Allegheny River, in Warren county?

MR. RUPP: No, sir, we have none.

A Member: You have none on the Allegheny watershed?

MR. RUPP: Yes, sir, we have in Westmoreland county, but it is only a small portion; it is very light.

A Member: In the southern part?

MR. RUPP: Yes, sir; none near the head water. We have some in Cameron county.

A Member: What do you sell these little pine trees for planting at?

MR. RUPP: The intention is to sell them at cost and that may vary. We have three nurseries, and one nursery may produce them cheaper than the other, and considering the transportation, you could not have a definite cost, but the intention is to furnish them at cost.

A Member: Have you sold any yet?

MR. RUPP: Yes, sir, we sold a few, but at the present time we are able to plant on State land more than we can raise. I am willing to go on record as saying, with the fullest credit to the nurseries in the business, that the State will be able to furnish its citizens with seedlings at one half what would be paid at the nursery.

A Member: Do you believe there is any profit made in planting locust trees?

MR. RUPP: There is. It depends, of course, on the section of the State. The great enemy of the locust is the locust borer. Take Westmoreland county and the western part of the State, we do not have much evidence of the borer, and in this section it is profitable to plant, and where you want timber to last a long while there is nothing more durable than locust.

MR. HUTCHISON: How long will it take a locust tree to grow ten inches in diameter on fair soil?

MR. RUPP: About thirty years on the average soil.

The SECRETARY: How large do you want it to grow?

MR. HUTCHISON: I only want to know the length of time it takes to produce locust. The railroad company is planting large numbers of them, and I was sort of anxious to know how long it would take to grow them ready for use.

The SECRETARY: In the thirty years, what is the growth?

MR. RUPP: I was taking the average soil. You can produce it in a shorter time on good loam soil, but that soil you would not care to devote to growing of trees when you can farm it.

MR. HUTCHISON: Would you recommend the farmer to plant on his soil locust, or black oak, or red oak, pin oak or what?

MR. RUPP: For posts?

MR. HUTCHISON: Growing for general profit.

MR. RUPP: If the farmer took the quick growing species, the locust would be one of them, North Carolina poplar another, and the maples are another, and the red oak is a very good one. That is being grown by the Pennsylvania Railroad Company at the present time to take the place of their locust which they had originally started out to plant.

MR. HUTCHISON: What about the white pine? Does it not grow fast?

MR. RUPP: The white pine is all right, but that is for home consumption. It would not pay the farmer to plant the white pine for farm purposes.

MR. HUTCHISON: How would yellow poplar do?

MR. RUPP: That is a good tree and quick grower. The planting of trees must be determined on the ground. One man might tell your neighbor to plant locust or poplar, and the man on the other side to plant something else. The conditions might differ, and it would not be advisable to recommend anything until you were on the ground and able to see the conditions.

MR. HUTCHISON: Would you recommend catalpa?

MR. RUPP: Not in this State on account of the frost. It has been tried at Mont Alto. As long as you keep the terminal buds protected it does well, but it does not seem to be the right locality.

A Member: How about North Carolina poplar?

MR. RUPP: It is all right. It is a little bit softer, but in durability it is as good, although not very durable for posts.

A Member: What success have you had in controlling the Chestnut Blight?

MR. RUPP: They have started out on that and as far as they have gone the only remedy at hand at present is to attack the tree itself and burn the bark, and in that way destroy the spores, so it cannot propagate any more. There is nothing to prevent it from spreading as long as spores are available, and the only thing to do, we have to make a wholesale cutting, and attack and destroy the bark or the tree if necessary, so that you destroy the life of the germ.

MR. HUTCHISON: Would it pay to raise black walnut?

MR. RUPP: Yes, sir, it would.

MR. HUTCHISON: How long would it take to grow a tree of black walnut ten or twelve inches in diameter?

MR. RUPP: To grow the black walnut with any success you have to consider the conditions. You have to put it on good agricultural soil where you get deep loam and then black walnut will grow favorably with the white pine, and in fifty years you will have a good big tree of black walnut on good soil.

MR. HUTCHISON: We can grow them a foot thick in twenty years.

MR. RUPP: You have a good loam soil then.

MR. HUTCHISON: Yes, that is a fact.

MR. RUPP: I don't believe it would be a financial proposition to plant black walnut because that soil you want for farming.

A Member: Isn't a fact that locust will do much better in some localities than another?

MR. RUPP: Oh, yes, indeed. As I said before there are some localities not affected with the borer, Westmoreland county, and take along certain ridges there they are not affected with the borer yet. On the other side of the ridge they are.

A Member: Are there not some varieties of locust much more affected than others.

MR. RUPP: I do not know.

A Member: I think I saw that difference on my own farm.

MR. RUPP: There may be different varieties of locust, but the locust we speak of commercially is black locust. On the State reserves we are doing a little planting of the honey locust. I planted a plantation this spring of four thousand honey locust and they are doing well, and I think it is a good move, and if I were to plant I think I would plant the honey locust in preference to the black locust when on fair soil.

A Member: How does the lasting quality of it compare with black locust?

MR. RUPP: Not as well as black locust.

A Member: What would be the general reasons for planting the honey locust in preference to the yellow?

MR. RUPP: The honey locust is a yellow locust. You mean in preference to the black locust, that is planting of honey locust in preference to black locust?

A Member: I understand honey locust in our county is different. We call it yellow locust the good substantially, durable locust. And there is the white locust.

MR. RUPP: The white or yellow we don't make any distinction. We call it the yellow or honey locust, and the other the black locust. There is no difference between the two former. I think from personal observation that the honey locust will really grow as rapidly as the black locust and it is less susceptible to the attack of the borer. Using the locust for making pins and one thing and another like that, the honey locust would be just as good as the black locust, but if for railroad ties or posts, why I think that the preference must be given to the black locust. I am speaking from a commercial standpoint.

A Member: There are three, the honey, the yellow and the black.

MR. RUPP: Honey and yellow are one.

A Member: They have some ornamental ones they call honey.

MR. RUPP: Oh, yes, we have dozens of varieties when you go into the horticultural species.

The SECRETARY: What you are calling the honey locust is the locust with smooth bark and long trunk?

MR. RUPP: Yes, sir.

The SECRETARY: Are there two distinct species besides that, a white and black?

MR. RUPP: There is not to my knowledge; if so it is a horticultural variety.

The SECRETARY: My own thought is that the white locust gets its peculiar color from growing out on cleared land. I may not be right on that. I want information.

MR. RUPP: I could not tell you whether that is so or not. I would like to ask Mr. Rodgers if he knows anything about that; is the white and black locust the same?

MR. RODGERS: I don't think they are. Their lasting qualities as far as my experience goes, are entirely different. The white locust will not last as well and my impression is that is so because it grows on the cleared land.

The SECRETARY: I certainly think that grown on the same land it should last as well. I am glad to be informed in regards to that. We have the black locust but none of what is called the white.

MR. RUPP: He spoke of the white locust. I think he referred to the yellow and honey locust.

The CHAIRMAN: Wouldn't it be profitable to plant spruce?

MR. RUPP: Spruce for what purpose? The spruce is all right. We are planting spruce for ornamental purposes. The Norway spruce, which is a large tree, and the Department has been considering whether they would plant more Norway spruce and less white pine. But we will have to take the section of the country into consideration if we wish to make the change. We know that the pine will grow in a soil that will hardly produce any other tree. If we switch to the Norway spruce we are apt to have a little better soil.

The CHAIRMAN: We have some out our way twenty-five years old, and they are sixteen to twenty inches now, and they grow fast.

MR. RUPP: The only trees I know of are those that are planted ornamental.

The CHAIRMAN: It is the Norway spruce that I have reference to.

MR. RUPP: Yes, sir.

The CHAIRMAN: You have heard the report. What action will you take upon it?

MR. HUTCHISON: I move that it be received and placed on file for publication with the proceedings of the Board.

The motion was agreed to.

The CHAIRMAN: The next topic is the report of the Economic Geologist, Dr. Isaac A. Harvey of Lock Haven, Pa.

The SECRETARY: Mr. Chairman, I have not seen Dr. Harvey. I suppose he is not here. I had a letter from him this morning saying he would try to be here if possible, but if not here his report will be here by tomorrow.

The CHAIRMAN: The next on the program is the report of the Agricultural Geologist, W. H. Stout, Pinegrove, Penna.

MR. STOUT: Mr. Chairman, Mr. Martin, gentlemen of the Board and Citizens: In listening to this talk on forestry, it brings up some reflections that come to me from my travels over the State, realizing the fact that the soils have a great deal to do with the growing of all crops, and the forest growth is always the largest on the richest soil. When we travel over the agricultural sections of Eastern Pennsylvania, and go into the limestone country and little valleys you will find the great oak and hickory tree and hard wood, and when you go up in the hills and get on the ridges it is changed to pine and hemlock; and then too I have observed also that in the valley, not only the forest trees grow larger, but the barns and the houses and the people grow fatter and a little more indolent than they do in the agricultural soils.

MR. HUTCHISON: You saw how they were up our way last week.

MR. STOUT: They are all fat up there. I had hoped that Mr. Harvey would be here, and that I might gather some information from his discussion on this subject, but in his absence I have to depend upon myself.

Mr. Stout then read his papers as follows:

REPORT OF AGRICULTURAL GEOLOGIST

By W. H. STOUT, *Pinegrove, Pa.*

As distinguished between Economic and Agricultural Geology, the former relates to minerals and metals with other useful substances in civilized countries. Agricultural Geology relates to that more important division relating to soils, the producing elements of energy, of muscle, flesh, bone and brain and life itself. The herbs of the soil provide the essential elements to support all animal creation upon the earth, all of which derives nourishment from Mother Earth. Although there exists a liberal library upon Agricultural Geology, it is comparatively small compared with Economic Geology, evidently because in this country, its importance was not realized earlier as long as unlimited resources of fertile fields could be obtained for the asking and Uncle Sam was rich enough to give us each a farm.

It seems only recently that the fact has dawned upon this nation that agriculture has not kept pace with the natural increase of population and the great influx of immigrants, that an alarm was created by high prices and in some lines a shortage of food products. Occasionally, bulletins are published by the Experiment Stations, but are not extensively read or heeded, and lately the United States Department of Agriculture has entered the field under the title of Soil Survey, in which is engaged a large force of very talented scientists as also some that are not overly qualified.

The voluminous nature of the Soil Survey publications militate against popular interest and the introduction of a new nomenclature, introducing new names for many formations about which there already exists confusion between National and State designation, renders them even less popular. What was known formerly as limestone soil of the great valley south of the Blue Mountain is termed Hagerstown loam, alongside of the Utica and Hudson River shales and slates termed Hagerstown shale loam, Hagerstown stony loam, Hagerstown sandy loam, Porter's black loam, Porter's clay, Porter's sand, Cecil clay, Cecil loam, Sandy loam, Penn clay, Penn loam, Penn sandy loam; then we have Waverly, Marion, Miami, Hanover, Mackinaw and a great variety of local names that apply to practically the same soil characteristics in various and distinct localities. The glacial deposits of the northern section also receive many new names, according to the locality where examined, although the clay, sands, gravel and boulders are practically similar.

Whatever the sources of a soil may be, a proper proportion of sand and clay are the requisites for a good, friable, retentive, easily worked soil. If lacking lime or other substances, these can be supplied and the soil made fertile; now found necessary on many fields that were once productive but depleted by cropping. This State and the country contains a great variety of soils, taking the entire area under cultivation and it is evidently unfair to make this a standard for comparison in crop production with other countries.

England is an illustration. An island of small dimension with a humid, cool climate, tempered by the Gulf stream and a soil largely composed of chalk and lime or volcanic and glacial deposits, with an average yearly rainfall and no such protracted periods of drought to which much of this country is subject, the conditions are quite different. In some parts of Pennsylvania like the counties of Bucks, Berks, in part, Lebanon and Lancaster, the average yield would compare favorably if not fully, with that of any country, while the Mississippi Valley or the states on the Pacific Coast would afford a fairer comparison.

Maine produces more bushels of corn to the acre than any other state, because there are only a few acres, seventeen thousand, in corn; New Hampshire, Vermont, Rhode Island, Massachusetts and Connecticut exceed Iowa by ten bushels an acre, but the Eastern States cultivate only two hundred and thirty-nine thousand acres, while Iowa cultivates nine and a half million acres, or practically four times as much as all the New England states. So, with potatoes; Maine produces two hundred and twenty bushels average to the acre, while Pennsylvania reports eighty-eight. There are good reasons for the difference, in climatic and soil conditions, with the small area devoted to these crops.

The question suggests itself: If the average for the entire country were up to the highest standard, with thirty bushels of wheat, fifty bushels of corn and two hundred bushels of potatoes, what would the producers receive under such conditions?

In the less productive soils and sections, the Upper Silurian, Devonian, Carboniferous and other systems, where the cultivated ground consists of shale, stones, all clay or sand resting on the upturned edges of the bed rock, at uneven depths below the scanty soil, the

yield is reduced at a low average. It makes a material difference whether a soil is a hundred feet in depth or whether one or two feet.

A first class soil, if run over a screen of a fourth inch mesh, would practically all pass through, while that from shale and sand stone consists of material too coarse for plants to obtain the elements of plant food contained, affording a much smaller surface to the feeding of roots, besides the moisture holding power of the finer soil.

Loam, a term frequently used to denote a good soil, chiefly composed of silicious sand, clay and carbonate of lime, with more or less of oxide of iron, magnesia, various salts and decayed vegetable and animal matter. Sand and clay are principal elements forming soil that is friable, easy to work, retentive of moisture and fertility.

Sandstone forms a sand soil; the various shales form clay of various colors; red, yellow, black and intermediate colors; often a very fine clay, hard to work, and frequently if not generally improved by drainage.

There are thousands of acres of such land in this and other Atlantic Coast states, that might be redeemed and made fertile, if the same government aid was afforded agriculture, that is given to irrigation and draining swamp lands in the Southern and Western States. While in the Eastern states, agriculture is taxed and tariffed to supply funds to redeem a great area of unproductive land and bring it under cultivation, they are asked to create competition with themselves and supply the money to do it. A little digression from the strict adherence to the text may be permissible, because all that is mentioned bears upon the subject under consideration.

There is much concern about the future in agriculture in this country and the abandoned farms in many sections, yet the industry seems prosperous in production and no abandoned farms found in sections where the soil is naturally fertile. The rocky cliffs, beechy shale hills and tenacious clays cannot be made to maintain a successful agriculture, except at a cost far above the value of ordinary crops and the owners of such lands are not financially able to specialize. After eking out a precarious existence under adverse conditions, without capital to change to poultry, fruit, dairying, fish, frog or skunk farming, the land must simply be abandoned to avoid distress or starvation in many instances. The encouragement for farmers to produce larger crops does not appear very flattering, when the results are analyzed, when large crops such as were produced last year are worth less than the medium crops of other years.

Having no control over the prices at which general farm crops must be sold in competition with all the world, and the different sections of this country, there is little or no profit except perhaps, in sections where the soil is fertile and not depleted of fertility by constant and long cropping. The crops produced last year in this country amount to the vast sum of nine billion dollars in value, yet dividing it among the six million farms in the country the average share of each is fifteen hundred dollars. In this State the farmers spend about eight million dollars a year for commercial fertilizer, how much more for lime and manure, there are no records, but the money spent for these articles is a large aggregate.

Things that farmers must purchase, taxes, labor, fertilizers, railroad fares, freight and express rates are not reduced, while farm crops are worth eight and one-half per cent. less than one year since; the

decline amounting to two hundred and thirty-six million dollars. There is nothing to encourage agriculture, except the plaudits of transportation lines and consumers; these spur the farmer on to renewed and more strenuous efforts, for the coming year. The report was current recently that the German Government proposed to levy an almost prohibitive export duty on potash, so much needed in our agriculture, that it seemed advisable to annex that country to this, to secure cheap fertilizer. Since the reports were first circulated, the German *Kali* importers explain the situation in recent "ads" in agricultural publications, indicating that the tax will be from fifteen to sixty-five cents per ton.

Farm practices in the treatment of the sands and clays are not always scientific, and farmers are severely criticised, especially by some people who do their farming in cozy offices on rosewood and mahogany desks, from the theories advanced by impractical students, with limited environments and close at hand observations, and from these formulate a theory, that does not meet general conditions. Farmers are also criticised for soil exhaustion and small crop yields, while the fact is that few farmers wilfully deplete soils, except as the products are needed to meet necessary expenses and to support themselves. Undoubtedly, many farms are producing less than fifty years ago, because, grain, hay and livestock were sold for needed funds. Throughout Eastern Pennsylvania, there was scarcely a stream available in farming communities, that was not employed in grinding grain for export and city uses as breadstuffs, besides numerous distilleries turning corn and rye into an abomination before the Lord, in the form of whiskey, thus destroying one of the most important National resources to provide food and drink for the hungry and thirsty, at home and foreign countries.

After all the years of tillage, the sands and much of the clay remain, although somewhat diminished. Transported soils by water or through glacial agencies contain a variety of sand and clay mingled together from various formations, while soils derived from the underlying formations are the same as the rock from which derived and, in many places where the stratification is vertical or steep dip, there is little uniformity, but a considerable difference in short distances. Our honored Executive, Governor Stuart, in his late message to the Legislature, writes thus: "The farms must be saved from exhaustion of the soil." Possibly, the Legislature in its wisdom may devise a method to accomplish the object and solve a problem that has concerned many generations and many nations, without a successful solution until now.

The subject of soil preservation is simply a question of economics, while the principles enunciated by eminent scientists are recognized as established facts; to carry them out, however, under prevailing conditions, is another problem. When the average farm products realize the producer thirty-five cents on the dollar, it becomes a question of dollars and cents. While it is true that the application of potash, phosphorus, nitrogen, lime, manure, turning down green crops and intense cultivation does maintain fertility, the question of cost and the capital necessary to conduct operations and await results enter into the problem which the average farmer does not possess.

The problem of soil preservation is one that has concerned nations for ages and is therefore not new. All nations in history had the same experience; their rise and fall, a prosperous and declining agriculture, extravagance and corruption in government, waging wars of conquest with vast armies that wasted all the wealth that agriculture could produce, are now in a condition of ignorance and bigotry. Some of the most renowned, once famous, prosperous and wealthy sections are today the homes of poverty and distress, remembered only in history, poetry and tradition.

The CHAIRMAN: You have heard the report of the Agricultural Geologist. What action do you desire to take upon it?

MR. HUTCHISON: Mr. Chairman, I move that the report be received and filed and printed in the journal of our proceedings.

The motion was agreed to.

The CHAIRMAN: The reports are now open for discussion.

A Member: Would it not be in order to receive the report of the committee to wait upon the Governor and secure his presence here?

The CHAIRMAN: If that committee is ready to make a report we will hear from them now.

MR. SHAFFER: Your committee beg to report that they have conferred with the Governor, after some difficulty in finding him, and he has advised us that he will be here at three o'clock this afternoon.

The CHAIRMAN: That will be thirty-five minutes yet so we will take up the discussion of the reports presented. We have had the reports of the Committees on Fruit and Fruit Culture, Forests and Forestry and the Agricultural Geologist, and any of these reports can now be discussed, and we can then go on with the next topic on the program.

MR. HUTCHISON: Mr. Chairman, it is important that we have some reports coming in when the Governor will be present. If I understand it rightly, you only have one more topic on the program for this afternoon and would it not be proper to take up this time that we have until his appearance with discussion on some of the subjects brought before the Board by the numerous reports. There are quite a number of men here who are good speakers, with different views. Let us now put in this half hour discussing some of these able papers, such as this valuable paper of Mr. Stout's that has brought out some wholesome truths about the soil; so that we could have a good paper or lecture when the Governor is here.

The CHAIRMAN: Any other one wish to make any remarks on the reports. If not, I will include the report of the Committee on Roads and Road Laws. We will always get a discussion on the road question.

The SECRETARY: Don't you think we better postpone any discussion on that subject until the Governor is in so that he can hear what the farmres are thinking about it?

A Member: Mr. Chairman, I would like to ask the representative of the Forestry Department to give us the life history of the locust borer.

MR. RUPP: Mr. Chairman, I am afraid I am not able to do that off-hand. I could not do it, not to give it in the way that I would care to give it to you; but I will work up the life history for you and send it to you if you will let me have your address.

The Member: Later on.

The SECRETARY: I would suggest that at some of our sessions we will have with us some of our entomologists that are associated with the Bureau of Economic Zoology who will answer that question and we will let that go over for the present and get the answer for the benefit of everybody. If you have it written to you, what is the other fellow going to do?

MR. WELD: Mr. Chairman, as Chairman of the Committee on Memorials, I wish to ask if there are any members deceased or ex-members deceased except Mr. Jason Sexton in the past twelve months.

MR. GLOVER: Mr. Charles Miller, who conducted institutes in Snyder County, passed away in December.

The SECRETARY: Is he an ex-member of the Board?

MR. GLOVER: No, sir.

A Member: There is a matter which interests me and also the people in our section of the State, brought out in the report of Mr. Knuppenburg on spraying for San José scale. It is a question of forestry in our county, preserving our trees, and I would like at this time a little discussion in regard to the question as to the merits of the different kind of sprayers for spraying. We have a number on the market and I would like to have a discussion on that just now, a little information from anyone.

The CHAIRMAN: Has anyone anything to suggest along that line?

The SECRETARY: Mr. Chairman, I have only the same suggestion that I made a moment ago, that that matter can be taken up when we have someone in here from the Bureau of Economic Zoology who will be able to give us the right information and we can get it first hand.

MR. HUTCHISON: Mr. Chairman, I would like to ask a question on poultry: What is a good average produced at this time of year from a pen of 160 hens? The majority of them were pullets. What would you consider a good average egg production, Mr. Wittman?

MR. WITTMAN: If they were my hens I would want at least 100 eggs a day, and if I got less than that I would not be satisfied. On the other hand, lots of people are not getting any at all with that number of fowls.

MR. HUTCHISON: What would you feed them to produce that number of eggs?

The SECRETARY: Weed seeds?

MR. WITTMAN: On a system of high feeding. That is the matter I brought out this morning, that we can feed husks and hulls but get no results. Give me the good red wheat and some corn and perhaps some buckwheat, some oats, barley and Kaffir corn, and some weed seeds to vary the ration. We people, if we had to make our ration on bread without butter or salt, would get hungry and if we want to force feed the hen we have to feed succulents or something to tickle and keep up the appetite, on the principle that when that is done they will eat more of other things. I can count my eggs from the feed that is given the hens.

MR. HUTCHISON: How often would you feed these chickens in a day?

MR. WITTMAN: The succulents I would bring down about the middle of the day when there is no danger of their being frozen. The others I would feed once a day, put the feed in the scratch litter, about the middle of the afternoon, three or four o'clock fill up all the cracks with a good rich mash, put in good rich food, muscle builders.

MR. HUTCHISON: Wet mash?

MR. WITTMAN: Yes, sir. I am very glad to see New York has just published a bulletin condemning the principle of feeding dry mash. The people who are feeding dry mash are losing money. It is not an economic way to feed and get good results.

MR. HUTCHISON: Brother Cornman, what is your experience feeding wet mash?

MR. CORNMAN: Brother Wittman and I would not agree upon that. My experience is that dry mash is a more economical feed than wet mash and fed more successfully.

MR. STOUT: Mr. Chairman, it seems to me that these poultry experts must have a bonanza when it comes to eggs that sell at forty-five cents a dozen; when they get a dozen while we are getting five or six it strikes me that they must have a cinch.

MR. WITTMAN: This is my objection to dry mash: I cannot get my hens to eat enough to lay me 100 eggs a day. On my travels this winter I met a man who complained about his chickens and when I went and look at them I found he was feeding dry mash in a box with a slip on the top of the box and that man was feeding a pollution of hen manure, and that is likely to add intestinal troubles and get their bowels out of order and if they would have intestinal worms it might affect the whole flock. In feeding wet mash or dry mash people must use common sense.

MR. CORNMAN: I want to say the man who feeds dry mash exclusively will make a failure. I only advocate the feeding of dry mash once a day. I want to give in the morning the small grain in the litter and make them work, work for every grain of that they get, and during that period the hoppers are closed. At noontime I want to open the hoppers and let them have access until roosting

time. I want the birds to work in the morning. A working hen is a paying hen and you want her to work in the morning if you want to get eggs.

MR. HUTCHISON: Will they eat as much dry mash as wet mash?

MR. CORNMAN: Yes, sir. As much dry mash as wet mash and eat it in a much more sanitary condition. I can keep the sanitary dry mash in the hoppers and you cannot keep wet mash in a sanitary condition; unless you scald your vessels every day you are bound to get sour feed in there and it is almost impossible to feed wet mash in a sanitary condition.

MR. WITTMAN: If any one in the room will try to eat a mouthful of that dry mash and remember the hens have no spittle or teeth they will not wonder that the hens have to screw it down and go through all sorts of contortions. I want my hens to eat comfortably and be happy. I know that chicken men are divided in their ideas about the possibilities of dry and wet mash. On the other hand, the wet mash fellows can show the advantages to the dry mash fellows in raising chickens or producing eggs. I can keep my wet mash sanitary by giving only what they will eat up quickly. It must be good and liked by them, and enough to fill up the cracks and let them be happy and enjoy themselves.

MR. CORNMAN: I want to say that they eat the wet mash entirely too fast. We had a discussion this morning with reference to weed seeds in chick food. I would have liked to have taken up the matter because I think Mr. Hutchison got the two confused. He spoke about scratch feed and then almost in the same breath spoke about chick feed. They are entirely separate and distinct. Now, in speaking of weed seeds in chick feed, it recalls to my mind an incident that was told me personally by a German in St. Louis. I was over at Chicago judging there. In conversation he said that he was interested in poultry and that he had started to raise chickens out from St. Louis and he said: "I sure did have troubles of my own. I goes to St. Louis and I buys a lot of that prepared chick food and I have chickens all over the farm and I feed them all over the farm; and there was a little bit of seed they would not eat. I do not know what it is but the next spring the whole d——m farm was full of weeds." There are a lot of weed seeds in that chick feed that the chicks will not eat.

MR. HUTCHISON: I admit I had not read over that last part that should have made a clear distinction between chick feed and scratch feed. What I mean by chick food is particles of grain crushed. I did not mean to allude to the feed for little chicks at all.

MR. CORNMAN: Another thing that I have noticed is that a great deal of that chick feed has adulterants in it in the shape of grit and shell.

MR. HUTCHISON: Our law covers that and we prosecuted a number of companies that were placing grit and shell in their chick and scratch feeds.

MR. CORNMAN: You have it in the chicken feed largely used.

MR. HUTCHISON: You can buy that shell and grit for a small sum. The Secretary rules that they should not be in there under our law. I would like to ask a question. I was at the farmers' institute the last four or five days and there was a question came up in our institute about raising turkeys. In Shoemakers Valley they raise thousands of them and ship them to Pittsburg by carloads. In our valley it is almost impossible to raise turkeys. They all die when little or when they get to a little age. We don't know what is the trouble. We don't get such good fellows as Brother Wittman and Brother Cornman at our institutes at one time; but now we have them together I want to thrash this out. On this question if we had Brother Jackson, of State College, we would have another side. I will start with Mr. Wittman here. What is the cause for the loss of these turkeys when six weeks old?

MR. WITTMAN: Wittman is an old chicken doctor but he don't know much about turkey diseases. I think a great deal of the trouble is caused by lack of vigor. Where there is trouble I think the ground should be renovated and the young turks when they show the red should be turned loose and let look after themselves a little.

MR. CORNMAN: I think a great deal of the trouble is that the turkeys are too closely related. Where they are raising turkeys in a neighborhood they often select of their own young toms and breed in and in and you must have some other good blood to give vigor.

In reference to black head, I think the main trouble is disordered liver. If people who are trying to raise turkeys will go after the liver of the young turkeys as vigorously as they do themselves when they have a bilious attack they will have fewer diseases. As for the lice, they reduce the vitality of the turkey and thus render them more susceptible to disease but are not the cause of it.

MR. HUTCHISON: How would you prevent black head?

MR. CORNMAN: I don't know unless you would begin with the young turkey and at regular intervals give something for its liver?

MR. HUTCHISON: What would that something be?

MR. CORNMAN: Same as you would take, a liver pill, calomel liver pill same as you would take for yourself. Chase their liver and chase it vigorously.

A Member: I think Mr. Cornman and Mr. Wittman are both a little wrong in regard to the turkey question. You must all remember that the turkey is a wild bird and in its wild state is a healthy bird. It don't know anything at all about black head where it approaches the wild state and is then in fact a very healthy bird. I have on several occasions brought these wild birds up to my farm and kept them in captivity and have thus brought in new blood and the result was that my birds were very healthy. I have gone out of the turkey business but I have gained some experience and that is if we can introduce wild blood and get turkeys back near to nature we will lose lots of our troubles with lice and black heads. The active wild turkey will not be covered with lice, just the same as the active chicken, because it is active enough to play in the dirt and get rid

of the lice by their own natural means. If you go to doctoring a turkey—and I have had an experience of twenty years—you will find that you will kill the turkey. If you put grease on its head or the manufactured lice powder you will find the skin of the turkey is too tender to stand it. My experience would be to try to get a wild variety of turkeys to introduce into our flocks and we will finally bring back the turkey raising in this district.

MR. WITTMAN: I agree with the gentleman. Mr. Cornman said the trouble is with the liver. Of course it is. What do we farmers do? That turkey all winter through is fed on corn and the liver will not act. If you will give the turkey a natural run and a variety and plenty of food that mother turkey will lay eggs that you cannot kill the little turkeys. The eggs will hatch strong little turkeys. The black head is a disease the spores or germs or bacteris of which exist in the ground. Change the soil, renovate it. We can bring perfect health. Let the turkeys on the ground; we will run the chance of getting the black head. You cannot doctor the turkey; we should not doctor the chicken. Keep out the corn that spoils the liver and egg of the parent turkey and then we will have vigorous turkeys. In fact, we as Pennsylvanians ought to be ashamed when we say that we cannot raise turkeys when they raise themselves. We say that they are native here and our soil and climate is adapted to the turkey and we can raise them if we use common sense.

MR. HUTCHISON: In other words, have the turkeys out doors and not put in coops at all?

MR. WITTMAN: Yes; have the parent turkey out of doors all winter.

A Member: At what age would you let them out all winter?

MR. WITTMAN: I am talking about the parent stock. On the other hand, there is nobody ever kept the little baby turkey that grew in the hills in a coop.

A Member: At no time would you keep the old ones in?

MR. WITTMAN: No, never in a coop. Lots of people are afraid the little turkeys are going to get wet. I am sure the Spring rains are come to make them grow. Some people would have the young turkey sport a pair of boots and umbrella. Let us have strong, vigorous turkeys and then we can raise them.

A Member: Referring to the young stock, at what age did you say you would turn them loose?

MR. WITTMAN: Just as soon as they showed the red. Then it is perfectly safe. I do not mean when the heavy rain comes that we are not to get the turkeys under cover and let the mother hen roam over a three acre lot. I mean a little wholesome neglect and in a couple of generations we will have a strong sturdy race of turkeys, and put some of the original wild blood in them.

A Member: Isn't it a fact that turkeys are often hatched too early; that turkeys hatched from May to June always get along?

MR. WITTMAN: Yes, that may be true because of our way of stimulating by feeding all winter. If the turkeys are left go till later in the Spring their eggs are apt to be better and their hatches will likely be stronger.

Agriculture in Public Schools.

MR. BLYHOLDER: Too much turkey at one meal won't do, so I want to inject another subject that is not on the program. We have discussed for many years the subject of introducing agriculture in our public schools. It is a live question and the great trouble has always been that it has been said that we do not have books suitable to introduce in our public schools.

Now, the reason that I raise this point is that I want to call your attention to the book that I believe is the very thing to supply that want. We have all been handling it for a number of years and never thought of putting in the public schools, and that book is to take the place of the advanced readers in our public schools, and very naturally it does not only teach agriculture but it will teach the children business along with agriculture and I believe if we were to introduce in our public schools the proceedings of this body we would have a reader in that school that could not be equalled by anything. (Applause) Now, I refer you particularly to the proceedings of the Spring meeting. I do not know but what the Winter meeting's proceedings would do as well; but I think the Winter meeting has more business in it and is more of a business session than the Spring session. Take the proceedings of the meeting last May at Butler. I want you to examine that because I want to call the attention of the Legislative Committee to that fact, and I want you to examine that and then be ready to say to us whether you think this committee ought to put this proposition in proper shape and form to be put in your public schools as a reader.

The first thing the teacher would do would be to explain that this book is the proceedings of the State Board of Agriculture. The boy would say, what is this State Board of Agriculture. Well now, there is an opening for the lesson, for the teacher to explain that. Then we open up the books and we see how the Board conducts its business and the matters that are brought before it and discussed and it teaches the boy and girl to do business and how to conduct public meetings and it teaches the scientific truths of agriculture up to the very last day, because we have in our meetings those who are able to furnish us right up to the very latest, the scientific truths. Now I want to put this question before this body to think of, whether we have not got the very book we have been asking and looking for this long time. I believe with the research that I have made and the study I have made that this is the very book that ought to be put in the public schools. I think it would supply the want in teaching business, the conduct of public meetings and teaching agriculture in a way that we cannot get it in any other way. I raise this question because we have been discussing the subject up to this time and I would like to hear from some other persons because I think it is time we ought to act in this matter and because we appreciate that boys and girls are worth more than all the products and all the crops

we can raise and we ought to raise them and prepare them to take our places and be more successful in retaining the productiveness of the soil and raising products than we are because of the knowledge they would get and the facts being taught in this way would instill a taste and inclination to stay on the farm instead of leaving it. I say we would teach all that as we go along in the work. I would like to hear from somebody else.

A Member: I would like to ask if the gentleman who has just spoken ever taught public school?

MR. BLYHOLDER: Did I? Not public school, no sir.

The Member: Well, I just wondered. I have been there and gone through and know the value of it and I want to say that if the teacher is not willing to prepare to teach agriculture he ought to be relegated to the rear at once.

J. ALDUS HERR: Sometime ago we had the pleasure of introducing in East Lampeter Township, Lancaster county, agriculture in the public school, the first district in the county. Now there is not any class or any study that the pupils have taken to as readily as that. But our great trouble was, who was to teach it. Generally all of the teachers of the school would fall down at teaching, although many of them were brought up on the farm. Gentlemen, we better ask our normal schools where we are to get our corps of teachers from to put in our grammar schools to instruct in agriculture, so that our teachers come ably prepared to instruct. Now we have eight teachers in our township and I dare say that if you asked them separately they would hardly want to say that they were capable of giving instructions in agriculture. Now we want them. Had we better not ask our normal schools to instruct our teachers that they know how to impart that kind of knowledge?

A Member: I sympathize with Mr. Blyholder's remarks. I am a teacher myself, teaching twenty-four terms in the district schools, and I want to say that I have not had instruction in any one calling in the subject of agriculture. I have been born on a farm and lived there all these years and I have been teaching agriculture in Montour and Northumberland counties. I wish I had one of the boys here that I as a teacher have been unable to get interested in their school branches; but I have had that very boy take a hold of a question of balanced ration for the growing child, for the milk cow, for the driving horse or for the working man; and, in fact, that boy worked into the late hours of the night with the help of his father and worked out the balanced ration for the colt, for the boy and for the work horse; and if I ever saw a boy interested it has been that boy that would not take to his arithmetic or anything else; and I can teach agriculture in the public schools and I venture to say that the teacher that is interested in his or her work and cannot teach that subject had better be relegated from his business of teaching.

A Member: Mr. Chairman, I believe that the successful teacher is interested in his work, but I am dubious as to the value that will be received when the normal schools turn out machine-made agriculture teachers.

MR. A. P. YOUNG: The great difficulty with the teacher turned out from the normal school to teach agriculture will be that they cannot do it. They won't know how. If the normal schools will prepare themselves with a farm so that the pupils that they are turning out to teach agriculture can take hold of the tools with their hands and use them they will accomplish something like the question and will be ready to teach agriculture; but if they take nothing but theory they will be like the person who learned to swim, learned the theory of swimming, and when he fell into the water he drowned at once. He could not swim. Why? Because he had not learned how. He had learned the theory but he could not swim. Now you take a man out with a plow, no matter how good that plow or how smooth the ground, and tell him to plow the field and if he has never had the practice, although he knows the theory and he knows how to hold the plow, but he cannot plow that field without holding to the handles or having had practice at it. You cannot turn out teachers to teach agriculture from the normal schools as they are now organized.

MR. HUTCHISON: I am sorry I have no statistics here, but last year the State College conducted a Summer School to which they invited the teachers throughout the Commonwealth to come and I cannot recollect—is there anyone present who does—the number of teachers that came there and took that course last year, just lectures. They are inviting the teachers to come and receive this special instruction and they had quite a number there last Summer. That was when the College had its vacation. That big plant, representing a couple millions of dollars, was put into operation for the benefit of the school teachers of Pennsylvania to assist them in teaching agriculture. They had quite a class there and they taught them and have helped a great many of them. This year the Board has appropriated a certain amount of money that the Legislature gave them for the purpose of extending agricultural education and they are going to hold a similar school there this year where your teachers throughout the Commonwealth can come and receive that special instruction. I am sorry that Dr. Sparks is not here that he might take up this thread at this moment. I hope before we adjourn finally that there will be somebody present who will be able to present this subject in its true light. There is the place to get your instruction, where that great plant is located with all their advantages and their great corps of teachers to give this special instruction in the agricultural schools and subjects. But that is not getting back to the brother's question. He started in with the textbook. He wants to use this journal of our proceedings as a textbook and have it published cheaply and given to the scholars to read and study. That is the thought that Brother Blyholder gave. It is a question where these articles prepared by the different ones that appear before you would be the proper thing. I am afraid that the boys would soon catch me up on my grammar. The idea seems to be to put this material that we have been presenting here, such as my report, Brother Stout's able paper and the paper from the Forestry Department into their hands that the advanced scholar may read them and be posted on the subjects. Is that in your idea?

MR. BLYHOLDER: That is the point exactly.

A Member: I have been listening attentively to what has been said and I find a complexity of matters to be considered. As we look around here we see the forestry specialist; here is a man who has specialized in raising fruit and here is a man who has specialized along some other line. Now, all this is lumped up under the one subject of agriculture. You are going to ask the school teacher to make a study and be able to teach all these subjects. I do not believe a teacher, even one interested in agriculture, can go into the public schools and teach complete agriculture. I want to say that as a farmer, school teacher and as I hope a patriotic son of Pennsylvania, that such a teacher as that would be is absolutely worse than no teacher at all; because I know as it is at present that a great many things being adopted in the public schools have to be handled by the boy and girl before school hours and to them it appears like Josh Billings says: "A great many things we know aint so."

MR. STOUT: I want to say a thing, that we have too much curriculum in our public schools today. A great many of the boys and girls rising sixteen years could not tell you what the interest on \$3,000 for nine months is, and they are ready to leave our common schools and enter the high school. Our superintendent of railroads told me not very long ago they had a school connected with their railroad for scholars to learn telegraphy and they needed operators—and he put a single question to a number of the scholars in mathematics and that was, what is one per cent. of fifty, and there was out of two hundred about two answered the question. What do you think of your public schools today? What do you want to put anything more in for? I want to say that when you can learn that child to speak its own language correctly and write it correctly and make a proper calculation to do business in this world, you have laid the foundation of the education. If that child has any ability it will follow up and get your agriculture later on. Don't press it in the public schools too soon, because they have more than they can do now.

A Member: Mr. Chairman, I would like to say with reference to learning so as to use our language correctly that I listened this winter, at a county institute in Northumberland county, to a man on teaching the subject of language, and he told us how he could teach the pupil and before he got through with his address I noted mistakes.

Here is a supplemental reader. We can take this book we have here and teach it to our pupils. The pupils of our schools should know there is a meeting of the State Board of Agriculture in session at Harrisburg today, and how many do know? This book should be put in such form and published for distribution to the public schools of Pennsylvania and if given to me I will distribute it and I will teach it.

MR. GLOVER: As a teacher for eight years and a school director for five years I wish to speak on this question.

In Buffalo township, Union county, the directors adopted a textbook on agriculture for the eighth grade four years ago and it is

being aught as a regular study by our teachers in the two grammar schools and six ungraded ones. Some of the teachers are doing very good work while other teachers do not seem to take to it kindly though they teach it.

While visiting a grammar school a year ago the class in this study was reciting on "Bees" that day and they were greatly interested, and the teacher supplemented the text to make the lesson a valuable one. Then I spoke to the school on the Department of Agriculture, telling of the specialists who annually made reports on this and other subjects of interest to farmers and citizens of the State, to show them how the various resources of the State are cared for and developed, and all such reports made at the annual meeting were printed in a book and placed in the hands of the people to read.

Whether the reports and proceedings of this Board would all make suitable or interesting reading for the higher grades in agriculture may be questioned. But some of these reports would be suitable, interesting and profitable reading for advanced pupils who have completed the fourth and fifth readers, if the teacher would select the subjects which would be suitable, of interest and well prepared articles as most of these reports are. To take the report as a whole and read, it would not be a suitable book though it does contain much matter which pupils could learn by reading some of these reports or articles and learning something of agriculture and of this Board.

A Member: We are talking about educating the boy and girl for farming. Now, we are citizens here. I suppose most of us farmers and a good many of us have boys and girls. I know I have. Now, it seems to be conceded that every person is born for a certain purpose and if they carry out strongly that purpose they as a rule meet with success for their labor, whether it be as a farmer, store-keeper or clerk. Now, the theory is to get an education, and what we mean by an education is reading, writing, geography, and arithmetic. Those things are the main stand-bys. Now we come down and we arrive at the age of 18 or 20 or 21 when we start out on our own hook. If we have the education in that what are we going to do? How are we going to be a farmer? Some fellows have planned for their children. My brother had a boy, a farmer, and he went away to school and after he was there several years the boy came home and my brother says, "Do you want to be a preacher," and he says, no; and he asked, "What are you going to do? Whatever suits me. And he started on the railroad and he took pride in it and he now has a responsible position. Now, suppose you institute the education of the farmers. What I say is this; that you give the scholar the common school education and if he will be a farmer and farm he will pick that up himself. If he is going to be a clerk in a store he will pick that up. He has only got a start in this world—I mean a start to learn and then he commences to learn. And it is that way in farming. I am a farmer. I learned the carpenter trade and I am not afraid of any kind of business for the carpenter. I served twenty-one years on the farm when a boy, and after I have served that long on the farm, I am now getting back in the things and in the ways for farmers and I have to learn to do as much as when I started out farming when I was on the farm and was learning.

MR. JOEL HERR: We were wandering all around the subject and I don't know whether I know what the subject is. It seems that Brother Blyholder desires to introduce our proceedings as a text-book in the public schools. It may be all right to read if the teacher is competent to select the proper subjects and something with correct language. We have to set before the pupils something that is entirely correct in language and we would have to use choice language and a great deal of our exercises and proceedings of the meeting is not gotten up in the English it ought to be. But if the teacher is competent to select and pick out sections it would be proper and good reading. I take it the teaching of our children in the public schools agriculture is not to force the books in on them but to commence as early as possible to bend their minds in that direction and so arrange our text-books and have the right subjects introduced.

The Committee to wait upon the Governor, Messrs. Shaffer, A. P. Young and Wilson, here escorted his Excellency to the platform.

The CHAIRMAN: Members of the Board, I have the pleasure of introducing to you the President of our Board, the Governor of this Commonwealth, Hon. John K. Tener.

ADDRESS OF GOVERNOR TENER

Mr. Chairman, and Gentlemen of the Board, I hardly know what is expected of me at this time. You are probably in the midst of your business and interesting discussions and I do not want to inject my presence here especially or in any way that may distract from that and from your duties and the business of the moment. I do not know whether you want me to attempt to make a speech or extend felicitations or welcome you to the city and extend to you the keys of the government, but I am willing to do most anything, Mr. Chairman.

However, while I am on my feet and realizing that you do not expect from me any extended remarks, and neither is it my thought or my purpose to interfere with the regular business of this society today, I am glad, indeed, and I am not unmindful of the honor that is mine at this moment in being invited to come down and to meet with you here and to look each of you in the face.

I believe that we here in Pennsylvania enjoy an unenviable position and record and that we do not put our best foot front in those things and in those enterprises and industries in which we live. Other states lay their greatest claim to fame perhaps in the things that nature has very bountifully endowed them with. They claim for their state, perhaps, that it is the greatest state or best state because of the grandeur of the mountains or running streams or its climate; but here in Pennsylvania our greatest claim to fame is the accomplishment of our people; what our people do; the achievements of our people and the splendid citizenship that we have here. (Applause)

I am coming down to material things and what this State has accomplished. It is admitted, of course, that Pennsylvania is the greatest state in mining and in iron and steel industries; but we

do not hear so much about Pennsylvania as an agricultural state and yet each of you, I am sure, know that in Pennsylvania our crops perhaps average better than the average of the United States and that our fruit, our apples, perhaps, are of a quality superior to those of any other place in the United States, but this is not known generally, nationally or to the world.

You are here to consider, I presume, how you can better exploit and better apply what is known to science today for the enlightenment and betterment of the farmers in our whole community, and I hope that the outcome of this meeting will bring something that will be educational for the farmers throughout the State and that they may through the radiance of your good work here enjoy the knowledge that you obtain here today.

I want to thank you especially and again for the privilege which is mine and which I do enjoy. While I am neither a farmer or agriculturist at this time, I was born on a farm and my greatest delight, as I believe everybody's is who has red blood in their veins, is to get out in the open and get down close to Nature. It is especially pleasant at this time to be a farmer, because if he is an intelligent farmer, applies the scientific methods at your hands today, has the qualifications of mind and the knowledge of the treatment of your orchards and all that sort of thing and able to have the modern conveniences, you live in the midst of the same modern improvements and have them just as close at hand as the people who live in the city, and besides have the great advantages of the open country life.

I want to also say that whatever little influence my office possesses, where it can be of use to the betterment or to the furtherance of the objects and principles of this society and this association, it is at your command. (Applause)

Mr. Chairman, with your permission I will resign the gavel to you and ask that you proceed and continue in charge of the meeting while I remain here as long as I possibly can.

The CHAIRMAN: The next topic on the program is the "Production and Use of Barnyard Manure," by Dr. Charles E. Thorne, Director of the Ohio Experiment Station.

The SECRETARY: Mr. Chairman, I had a telegram from Dr. Thorne on Sunday evening saying that sickness in his family would render it impossible for him to be here. I wired him at once to send a good substitute and in compliance with that request Mr. R. C. E. Wallace, of the Ohio Experiment Station, is here and will take up the subject assigned to Dr. Thorne.

MR. WALLACE: Mr. Chairman and Gentlemen of the Convention: You have heard the reason for my being before you and it only remains for me to express Director Thorne's regret at being unable to be with you and talk to you at this time. He had intended to be here but the very serious illness of his son made it impossible for him to come.

Professor Wallace then presented his paper which is as follows:

PRODUCTION AND CARE OF BARNYARD MANURE

By R. C. E. WALLACE, *Ohio Experiment Station, Wooster, O.*

Barnyard manure is essentially a by-product of the farm. By many it seems to be considered a waste product to be disposed of with the least possible care and the greatest possible dispatch.

In the past farmers, in general, have not understood the real value of manure as a fertilizer and have innocently been losing hundreds of thousands of dollars every year because of the indifferent methods employed in caring for this important product. Fortunately, through the medium of our experiment stations and agricultural colleges, we are now beginning to comprehend the importance of manure in maintaining and building up the fertility of our soils.

Just what value manure may have as determined by its composition is difficult to say because of the wide variation in composition of the substance in question. These variations add to the difficulty in discussing the valuation, application and other points in connection with manure, and in order to assist in an intelligent study of the subject it will be well to consider briefly a few of the influencing factors.

Different kinds of animals: Each species of domestic animal produces a manure of different quality and different physical properties. Manure from cattle and swine contains a relatively high percentage of water, does not ferment or heat rapidly, and hence is classed as a cold manure. Horse and sheep manure contain considerably less moisture than that of cattle and swine, it ferments easily and is classed as a hot or quick manure. In composition the manure from horses and swine is somewhat richer in nitrogenous materials than is that from cattle, while sheep manure usually contains a higher percentage of both nitrogen and potash than do any of the others.

Effect of the ration: The total value of the manure produced by a given number of animals is largely dependent on the quantity and quality of the food consumed. From 50 to 90 per cent. of the fertilizing elements in the food is found in the excrement of the animals, depending on their age and use, hence the composition of the food determines in large measure the composition of the manure. Foods rich in nitrogen and mineral matter will produce manure rich in the same constituents, while foods poor in fertilizing elements will produce manure of corresponding poor quality. For example—animals receiving a ration consisting only of roots, straw, timothy hay and corn stover will produce manure of relatively low quality, whereas such materials as clover and alfalfa hay, cotton seed meal, oil meal, bran, corn and oats chop, etc., would produce manure of much higher value.

The kind and amount of material used for bedding also influence the composition of the manure. It is probable that straw is the material most universally used as bedding material and it answers

the purpose very well. It is cheap and abundant, and while it is low in the elements of fertility it is probably one of the most desirable materials to use for this purpose.

Care of manure: After having produced the manure the next thing is to properly care for it; and the first essential in this direction is to provide a water tight floor in our stalls, and covered manure sheds.

A few years ago the Ohio Station conducted some experiments in the production of manure, by feeding two lots of steers; one lot being kept in box stalls with cement floor and the other lot kept in similar stalls having only an ordinary earth floor; the object being to compare the value of the manure produced on the different floors. With the exception of the two kinds of floors all the conditions were identical. The steers were fed for a period of six months when it was found that the total value of the manure produced per thousand pound steer on the cement floor was worth \$2.25 more than was the manure from a similar steer fed on the earth floor. The experiment showed further that there was an actual loss of six pounds of manure per head per day on the earth floor as compared with that collected from the cement floor. This amounted to half a ton per steer, or fifteen tons for the thirty steers for the six months of the test. Taking the average analysis of the liquid excrement from this sort of animal and figuring this on the basis of fifteen cents per pound for nitrogen and six cents per pound for potash, we find that we have lost over sixty-five dollars worth of fertilizer; and a better fertilizer, too, than would be contained in three tons of commercial fertilizer which it would take at the average price per ton to represent an equivalent value.

A Member: Might we ask how often the stable was cleaned?

MR. WALLACE: About once a month.

MR. HUTCHISON: Were the animals allowed to be out in the open or kept continually in the stable?

MR. WALLACE: They were kept in the stalls and allowed to run loose.

Probably the most common practice of handling manure when it is removed from the stable is to pile it in an open barnyard. Here it is allowed to remain all winter long exposed to the leaching effects of rain and melting snow, and by the time it is applied to the fields in the spring about one-third of the nitrogen, phosphorus and potassium originally present, has been lost. This is not mere conjecture. It has been proven by carefully conducted experiments that fully one-third of all the fertilizing elements present in manure is lost when the manure is exposed for a period of three months in an open yard, due to the agencies of fermentation and leaching.

The practice of drawing manure directly from the stable to the field is probably the best method we can use in disposing of the manure crop. Where this custom is followed but one handling is necessary and the possibility of the losses occurring in open yard storage is entirely avoided. This method of caring for manure is, in fact, coming into somewhat general use, but it is not as general as it should be, nor as it will be when farmers come to appreciate fully the value of the practice. In cases where it is desired to remove

the manure from the stable once or twice a day, and where our live-stock equipment is not sufficiently extensive to produce a spreader load within this period, the manure shed becomes a necessary adjunct. This need not be an expensive structure but it should in any case be provided with a cement floor. Here the manure may be stored until a sufficient quantity has accumulated to justify its removal to the field; and by having the manure spread evenly over the floor of the shed and keeping it well packed by allowing the animals to run over it, no very serious losses are likely to occur.

So far we have been discussing the care of manure in its natural state only. We learn from a large number of chemical analyses, however, that manure in itself is not a well balanced fertilizer for our ordinary agricultural plants; that it is relatively high in nitrogen and potassium and correspondingly low in phosphorus. Experiments have been conducted by the experiment stations of Ohio, Pennsylvania, Illinois and other states which demonstrate pretty conclusively that the same element, phosphorus, is the one in which most of our soils is deficient. With these facts before us, this question naturally presents itself—"Why can we not, by taking proper care of our manure, retain practically all of the expensive elements, nitrogen and potassium, and by the artificial addition of some phosphatic material, thus supplying the lacking element, phosphorus, thereby convert our manure into a well balanced and more efficient fertilizer?" This question we have endeavored to answer at the Ohio station by an experiment which has now been in progress fourteen years. The answer has been that such a practice can be followed with very decided profit.

In the experiment referred to we have compared manure taken from the open yard with that removed directly from the stall to the field, each in its natural state and also re-enforced with a carrier of phosphorus. As re-enforcing materials we have used the ordinary acid phosphate and raw rock phosphate, both of which have proven to be equally effective; a very slight advantage appearing in favor of the acid phosphate.

A Member: Have you ever noticed any injury to the feet of cattle where acid phosphate was used in the manure as you suggest?

MR. WALLACE: No, sir, we have not.

A Member: Have you compared floats with acid phosphate?

MR. WALLACE: Yes, sir. Raw rock phosphate is the same as floats. We have found them to be nearly equally effective when used as I have indicated.

A Member: What would you think of applying the phosphate just before plowing; the manure having been previously applied?

MR. WALLACE: In the case of acid phosphate I should expect a fairly good result. In case you used the floats, however, I am not sure that the return would be entirely satisfactory the first year. In order to secure the best immediate effect we believe the floats should be in contact with the manure for some time previous to application.

A Member: What is your opinion and information on hauling manure right from the stable and putting on the ground when it is covered with snow?

MR. WALLACE: We should not advise spreading manure on top of a very heavy snow, because there is always a possibility of the snow going off with a rain in which case a part of the manure might be carried away by surface water. The danger from such loss is greater if the land is very rolling.

A Member: Were these experiments made on the same piece of ground?

MR. WALLACE: Yes, sir. They were made on the same piece of ground which was divided into three sections so that we had each crop grown each year.

The SECRETARY: I want to ask whether you would advise putting the phosphate material on manure stored in a covered shed?

MR. WALLACE: Yes, sir; by all means.

The SECRETARY: Is it effective in preventing fire-fang?

MR. WALLACE: No, it probably would not have much effect in that way.

A Member: Will it hold the nitrogen?

MR. WALLACE: Yes, sir; it will assist to some degree in conserving the nitrogen.

A Member: Do you think that floats are as effective as acid phosphate when applied to the ground separately?

MR. WALLACE: Our experience has been that the floats are much less effective when applied in this way.

A Member: Did you ever notice any difference in effect between manure applied in the fall and early winter in comparison with that hauled out in March?

MR. WALLACE: Yes, sir. The earlier applications have nearly always given the best results.

A Member: I have noticed that very materially. Was that the result of the early dressing or the crop that came after?

MR. WALLACE: Possibly both to some extent. I should be inclined, however, to give the major portion of the credit to the earlier application of manure.

MR. ALDUS HERR: We who are running dairy farms are obliged to clean our stables twice a day. I want to know what effect this ground rock would have if in cleaning our stables this morning we throw the manure in the manure spreader, haul it to the field and spread thinly over the ground. Would the effect be the same used in this way as if put in the shed or stable and left for a couple of weeks?

MR. WALLACE: We would hardly expect quite the same immediate effect, especially in case of the rock phosphate. Where stables are cleaned every day as you suggest we prefer to scatter the material in the manure gutters immediately after cleaning. The subsequent handling of the manure will result in the material becoming more thoroughly incorporated with it and will insure a more even distribution in the field.

A Member: When manure is not spread every day but stored in a bin would it be proper to re-enforce it?

MR. WALLACE: Yes, sir. Indeed it would.

MR. HUTCHISON: Mr. Chairman, I move that we have an intermission of five minutes to shake hands with the Governor, who will have to leave us shortly.

The motion was seconded, put and agreed to.

(Intermission.)

MR. MCGOWAN: The committee on legislation, of which I am chairman, will meet at 4:30 o'clock. This announcement was to have been made this morning.

A Member: I should like to ask whether manure applied to a wheat stubble field in clover would give a double benefit, in the clover and also in the corn crop following?

MR. WALLACE: Yes, sir. I should expect both the clover and the corn crop to be materially benefited by such an application.

A Member: How heavy an application of manure would you advise?

MR. WALLACE: That would depend somewhat on conditions. Experiments seem to indicate that, within reasonable limits, a relatively light application distributed over a larger area, will be more satisfactory than a very heavy application applied to a less acreage. Our custom is to apply from eight to ten tons per acre.

A Member: Have you any experience with top dressing after planting?

MR. WALLACE: So far as I am aware we have made no experiments along that line. However, I believe that such an application would no doubt prove helpful, to the wheat crop especially. Such an application should be thinly and evenly spread. Perhaps late in the fall after the ground is frozen would be the most desirable time to make the application.

The CHAIRMAN: Has the Credential Committee any report to make?

MR. RODGERS: The Committee on Credentials reports that Mr. C. H. DeWitt is elected a member of the Board from Tioga county.

The CHAIRMAN: Is there any action to be taken on the supplemental report of the Credential Committee or will we allow it to go over until tomorrow when we elect?

The SECRETARY: The others are to be acted on in the morning and this can be taken up with them.

The CHAIRMAN: Are there any announcements to be made at this time?

The SECRETARY: I might announce that the meeting this evening is to be a joint meeting of the State Livestock Breeders' Association, the Dairy Union and the State Board of Agriculture. It will be held in the large hall over in the Johnston Building. There is a hall there large enough to hold and accommodate one thousand people and there will be a very large meeting. It will not be possible for me to attend that session and I shall be very glad if I can be relieved and someone shall be appointed to act as Secretary pro tem.

MR. BLYHOLDER: I move you then that the Secretary be granted leave of absence and that Mr. Rodgers act as Secretary pro tem.

The motion was seconded, put and agreed to.

The SECRETARY: I am very glad, Mr. Chairman, that you have elected one who looks so much like me. We part our hair exactly alike.

The CHAIRMAN: Is there any other announcements?

The SECRETARY: I simply wanted to announce that there will be a question to be determined this evening as to who shall preside and what officers shall take charge of the meeting. The President of the State Livestock Breeders' Association is Mr. Norton, whom most of you know. He is from Waymart, Pa. The President of the Dairy Union is Mr. Stokes, from Hanover, York county, Pa. Our Vice Presidents, of course, will be there and you will enter into some amicable agreement with the gentlemen as to who shall preside. That is all.

On motion, adjourned to meet at 7:30 o'clock this evening.

Tuesday Evening, January 24, 1911.
Johnston Hall.

JOINT MEETING OF THE BOARD OF AGRICULTURE, BREEDERS' ASSOCIATION AND DAIRY UNION.

S. S. Blyholder, Vice President of Board of Agriculture, in the Chair.

The CHAIRMAN: The first topic on the program for this evening is the Report of the Veterinarian of the Board, Dr. S. H. Gilliland, of Harrisburg, Pa. Is Dr. Gilliland present? He does not appear to be, so we will take up the next subject: "Permanent Pastures and Meadows," by W. D. Zinn, of Phillippi, W. Va.

I now have the honor of presenting to you Mr. Zinn.

Mr. Zinn read the following paper:

PERMANENT PASTURES AND MEADOWS.

By W. D. ZINN, *Phillippi, W. Va.*

Ladies and Gentlemen: I think the Chairman said Professor when introducing me. I do not know whether to respond to that or not. I am a farmer, not a professor.

Friends, I am very glad to meet so many of the up-to-date farmers of Pennsylvania. I am sure you are all up-to-date farmers. They are the ones that attend the State meetings. As I look into your faces and see the interested expressions I appreciate being with you. That reminds me of a story they tell on a local preacher in my community. He always introduced his remarks like this: "My friends, I am glad to be here this morning, and I am very glad to see so many of you here." Finally he was invited to preach in the penitentiary and he began his remarks in the usual way: "My friends, I am glad to be here, and I am very glad to see so many of you here."

I am to talk a little while about Permanent Pastures. I come from an agricultural state, if you will permit me to call it such. You may think it a mountain state, a state of mountains and hills. We have them there. We do not have very much level land, and yet there are some places where you can find as many as five acres of level land unbroken by mountain or hill.

Only recently I attended a Stockmen's meeting in my own state, a unique affair. A gentleman who had been shipping cattle for about twenty years or more, shipping export cattle, gave a dinner. He had selected a show steer that he had bought, and having purchased forty thousand or more, and we had a real ox roast. I took a census of that meeting and I found those present (80 in number) represented five thousand seven hundred cattle; mostly export cattle. That is, these men there grazed that many cattle. Out of that number of cattle but twelve hundred were grained during the winter; the balance were fattened on the blue grass. I make this explanation that you can understand that we have some blue grass in West Virginia, but not as much as we should have, and we have not taken the care of it we ought. But we like blue grass, friends, because we think it is a pretty easy way to make a living, and we West Virginians don't like to work any more than we can help. They turn the cattle out in the Spring and see that they have water when they want it and that is about all the work many of the farmers there do. I know of farmers keeping one hundred cattle and not paying out as much as three hundred dollars during the year for labor. I have a neighbor, who was present at this meeting, and he represents six hundred export cattle that he finishes every year; and I asked him: "Do you grain any?" He replied: "No; if I cannot fatten my cattle on blue grass I will go out of the business."

But I am boosting West Virginia. Our pastures are sources of great income. Sometimes when I talk to farmers in other states they say, why land is too high to graze. You cannot afford to pasture one

hundred dollar-acre land. Let us see if we cannot. In France today there is a lot of land that rents for \$90 an acre for grazing. Now, they must keep some good stock on it. The reason why we cannot afford to pay high prices for grazing land is that we do not put the right kind of stock on it. If we graze on this pasture land the kind of stock that is grazed in France, viz., high priced breeding stock, such as they ship to us and sell at fabulous prices, then we can afford to pay \$100 per acre for good grazing land.

Our pastures in West Virginia, as well as in Pennsylvania, have been "running out." They don't produce as good as they did twenty-five to fifty years ago. In the meeting referred to I asked the question: "How many cattle can you carry now and how many did you carry twenty years ago?" Some reported that they only kept about one-third as many. There is something wrong. We understand at once why land runs out when farmed year after year. We know that the organic matter and the available plant food is exhausted, the land deficient in lime, and we have come to understand that the same thing happens with the grazing lands. Our grazing lands are deficient lands in organic matter and in lime, they having no available plant food, and we must take the same care of our pasture land as of the farming lands if we want to make them keep up their productivity.

Now it shall be my purpose to discuss the ways and means of doing this. We want to look upon our farms and our pasture fields as animated objects. The fact is they have or should have great deal of life. If you take your horse and work him without feeding for three, four or five days a week he becomes lean and weak, and if you don't begin to feed him he will die. We have been working our pasture lands for years and years and only giving them half rations and it is not any wonder they have become unproductive. Our fields must be fed; they must be clothed and taken care of just like the human body. If we fail to do that they will not give the returns they should. The Jewish law required that the land should have all that it produced every seventh year. I don't know whether those old Jews understood scientific agriculture or not, but they were practicing it. Every seventh year all that the land produced went back to the soil. For what purpose? To feed, clothe and make available the plant food for the next six years. Friends, I think we can improve on the Jewish method if we give the soil something every year. Let some organic matter get into the soil to make plant food available and that land will be productive for years to come.

There is no excuse at all for working out land. If you do not leave your farms better for your children than when you found them you have missed your calling in life. Our lands ought to become better; they must of necessity be more productive if the people are to be fed, because everything that we have comes from the soil, and in the future greater demands will be made upon it, for we are told in fifty years from now we are to have two hundred million people in the United States and all these people must be fed from the soil, so we want to take better care of it and give the land its share, no matter whether farming land or grazing land. If you are a tenant farmer you can rob your landlord year after year. I think I have had tenants to treat me that way. But if you are a land owner you cannot rob the land year after year without it resenting that kind of treatment. It will simply shut itself up to you and say: "You have not given me a square deal; you have robbed me and I

don't propose longer to give you a good crop." From these pasture lands you have been driving the livestock off for years. If it is a dairy farm you have been selling the milk off and in that milk there is a certain amount of plant food, and three elements that are found deficient in soils: nitrogen, potash and phosphorus. Whether we sell beef, mutton or milk we are taking available phosphorus from our lands. So, my friends, it is up to you to return this plant food to the soil in some way. It has been shown that many of our pasture fields have run out because the lime-content is too low. There is an acid condition in the soil and it is necessary if we wish to grow good pastures, to apply lime to the soil.

The question of lime is interesting a great many people at this time. We are just now waking up to the fact that nearly all of our soils are deficient in lime. Over in my state a few years ago a farmer came to me who had a limestone field of seventy acres, lying all over it was limestone rock. His clover had failed in this field and he wanted to know what was wrong with his ground. I said: "I suspect your land is sour." He replied: "It could not be. There is limestone all over my land. It is actually in the way." I said: "Have you tested the soil for acidity; if not test it." The man got blue litmus paper and applied it to his soil and found a great deal of acidity in it and he applied five hundred pounds of granulated lime to the acre and the next year got a fine crop of clover and has been growing clover ever since. That proved that even these limestone soils are becoming deficient in lime and we have got to apply the lime and there is nothing under the sun that will take its place. I had a letter recently from a farmer who said: "I want to plant twenty acres of corn"—that letter was from this State—"and I am in doubt as to whether to use phosphoric acid or lime on the land. What would you apply?" If that land needs phosphorus there is nothing will take the place of phosphorus, and if it needs lime there is nothing to take the place of lime. Test your soil and supply what it needs. I also told him that the probabilities were that the land needed both the phosphorus and the lime, because most of the soils in our state—and that is largely true in this State—are deficient in phosphorus as well as lime. You have been selling the small grains off the farm and these grains have carried away a great deal of the phosphorus, and possibly the manure has not been saved as carefully as it should have been and you have been losing there and the soils are all deficient in phosphorus and we must supply it.

Going back to the lime question: There are various forms of lime we can use on the pasture fields. Where you have the limestone, as you have it up the valley between here and Hagerstown, all I believe you need to do is to crush that limestone and scatter it over the fields. It is the safest form in which to use lime, because you will not burn up the humus when you apply that ground limestone. There is danger, friends, in using too much caustic lime. That burns up the humus and you deplete the soil of fertility. It will become a stimulant for the time being, but it will leave the land worse than it was at first. Be careful what kind of lime you use, especially on the pasture fields, because you don't have the chance to treat them as you might other fields, and I recommend the ground limestone for the pasture land. Lime sweetens the soil by the particles coming in contact with the particles of soil, hence it would be a great deal

better and the sweetening process more perfect if you could plow that soil and mix the lime in because the contact would be more general. It may not be practical for you to plow up the field and put the lime on top of the land. If not, you can get good results from the lime by simply sowing it over the land whether you plow or not. Sowing it on the sod will correct the acidity to some extent but not as perfectly as if you plowed the land and applied the lime on top.

The other day I was told by a farmer, when I said you can get too much caustic lime. He said: "I have used three hundred to four hundred bushels of caustic lime on land and the land produced good crops for twenty years." I said: "How did you apply that lime?" He said: "We apply in this way: We put it in small piles and let it lie there from two to four weeks and then scatter it over the fields." I said: "You are not applying caustic lime. That is carbonate of lime." When burned lime is applied in this way it air-slacks, and air-slacked lime is carbonate of lime. That is the reason why Pennsylvania farmers have been so successful in years past in using so much lime. They have been using carbonate of lime and did not know it; actually so, because that lime became air-slacked and when taken into the soil was in the form of carbonate of lime and did not burn up the humus. It is dangerous, my friends, to put into the soil anything like three hundred bushels or one hundred bushels of caustic lime.

There may be various causes why our pastures become unproductive. As I have said, they may need lime, plant food and phosphorus. The dry weather may have caused the roots to die and the worms may have killed it. I have had all these things happen to my pasture land until I absolutely had no grass. What are you going to do then? If we could plow and reseed, the problem would be easy, but that is not always practical. I am going to tell you what I did. If it suits you, you can do it; if not, you can reject it. We go on to those fields and we harrow them. If the field is smooth we take a double acting cutaway harrow and that is the best I have tried. We cut it up pretty thoroughly so there is little or no sod left. That ought to be done as early in the Spring as possible, February if the ground is in proper condition for tillage; if not, later on. March will do, and April may do. May I think is too late as a rule. I put the lime on before I start the harrowing, sometimes with the grain drill, sometimes a lime spreader and sometimes with a manure spreader. And, by the way, my friends, there is no place on the farm that I believe you can get more out of the manure per ton, except the meadow than on the pasture land. I have come to this conclusion; that we have been putting the manure on the wrong crop for years. My practice formerly was to manure the corn ground directly ahead of the planting of the corn. I never do that now, unless I have more manure than I need in either of these other places. I can get the most out of manure on the pasture land, meadow land or on a soil improvement crop. If you are growing rye and you want to turn that rye down to improve the land you can get more out of the manure by applying it to that land so you have a good heavy crop to turn down.

I take the manure spreader and spread manure over this pasture field. Try a small acreage at first. If you have fifty acres, try five or ten acres, cut it off from the balance of the field. I use the woven

wire fence for that purpose. Apply the lime and manure if you have it. I have applied commercial fertilizer, but I will speak of that later, and then put on some grass seed. There is little or no life in that soil, no plants there; so you want to sow some seed and this is one very important question for the farmer to consider. Twenty-five years ago, when I was a boy, my father would send me out to sow timothy seed or sow the ground to grass and we never thought of sowing anything but timothy seed, especially for permanent pasture. I sowed about a gallon to the acre and then we waited about two or three years for it to sod up. Now it sods up the next year with weeds if you don't put useful plants there. I think timothy is a very poor plant to sow alone in the pasture. It does not last long; it is a soil robber. It feeds on the surface, still I use a little of it. I sow four pounds each of timothy orchard grass and red top to the acre. I don't know what you think about orchard grass. Some farmers say they would just as soon have broom sedge, but I like any kind of grass that makes the Winter shorter and orchard grass shortens the Winter. It stands late in the Fall and comes early in the Spring. So we sow a little orchard grass. Red top will grow in an acid soil. It will grow in a sweet soil as well. It will also grow in a wet soil. If any of that land ought to be tile drained it will pay to do it. It won't pay to grass wet land. The red top grows in rich land. Of course, all plants do. It will also grow in poor land. It makes the sod thick and for that purpose I like to mix some red top, say four to six pounds. Then I would put in some Kentucky blue grass.

It is the greatest of all grasses in the United States and if you have plenty of lime in your land I am sure you can grow it. I sow from seven to eight pounds of Kentucky blue grass and I would be sure that the seed would grow. A good many farmers do not like to sow it because they say the seed don't grow. I want to tell you what the trouble is in many cases. In Kentucky they gather the seed with a one horse stripper. They drive over the pasture lands in June and strip this seed off and put it in bags holding from eight to ten bushels. The farmers sell this seed often before they get it into the barn. The dealers come out from the city and buy it in the field and haul it to the railroad and ship to some warehouse and there it becomes heated and then we buy it and don't get any blue grass when we sow it. Since I have learned this I have been buying my blue grass seed directly from farmers in Kentucky, those who are responsible and they send me good seed and I have no trouble to get it to grow.

I would not stop with that because we have not put anything in the mixture that will add any plant food to the soil. Nitrogen is the only element of plant food that we can grow into the soil, and this is gotten there by growing some legume. I sow nearly all the clovers. I would sow at least two pounds of white perennial clover, that will stay in the land indefinitely; two pounds at least of red clover and two pounds of alsike clover. We know that alsike clover will grow in acid soil more than red clover and will stay long. It is a cross between the white and red clover and has some of the characteristics of the white clover, being almost perennial in its habits. You could mix mammoth, but these three would be sufficient. Mix these? No. Sow the clover seed by itself and the grass seed by

itself. If you mix them altogether and sow, you will not get an even distribution of seed because some of the seeds are heavier than others and fly out further. Then harrow the seed in. I believe in planting grass seed just as much as planting corn and there is no farmer that goes out and throws his corn on top of the ground. They always plant it and I believe these seeds ought to be planted. A good many farmers in seeding have been losing their crimson clover. They sow it but don't get a plant. Nearly everyone, upon investigation, have sown that seed on top of the ground. It is a large seed and possibly germinates and it does not get enough moisture until it withers and dies. That ought to be harrowed in. And so with most of the seed. We should harrow them over; a brush will do; anything to stir it in; and by all means have the seed-bed as good as you can get it, if you must harrow it over several ways.

There are fields in West Virginia from which the grass has died out and we cannot harrow them. The only thing we can do is sow some seed over them. Some of them ought to be reforested and, in fact, I believe that some fields in Pennsylvania should be left go back to forest or have trees planted on them, locust or something else, because they are not worth taking care of and will never make good pasture lands.

Now these plants will need some fertilization, some available plant food, and before I harrow the land the last time I use some commercial fertilizer, and on the character of the soil, my friends, should depend largely the kind I would use, and by kind I don't mean any brand. I am asked: "What brand of fertilizer do you use?" It does not matter about the brand. There are a great many farmers, it is true, up in West Virginia that buy commercial fertilizers by the smell. If it has a strong odor they say it is the very kind of goods they are looking for. It may be worth five dollars a ton. Again they actually buy for color; if it has a good dark color that is the thing they want. I met one of these fellows coming from market with a load of fertilizer. I asked him what he paid for it. He said he got a confidential price on that and he promised the dealer not to give him away. I am always afraid of these confidential fellows and I began to insist on his telling what he really paid for it. The analysis was this: One per cent. of nitrogen; seven per cent. of phosphorus acid and one per cent. of potash. I figured that it was worth about ten dollars or ten dollars and sixty cents from the commercial value of phosphorus, nitrogen and potash. After I had insisted that he tell me, he said he got it for nineteen dollars a ton and that the dealer had sold it regularly for twenty dollars. I said: "You are the fellow who should not want to tell anybody you paid two prices for the fertilizer." There are a lot of farmers doing that. We are buying even what our land does not need. If this pasture land is heavy clay soil and has a reasonable amount of vegetable matter in it you don't need potash. I don't need it on my fields. I have asked my fields what they need and this is the best test and only correct test when we ask the land. The chemist cannot tell you. He can analyze the soil and tell you how much phosphorus, nitrogen, humus and lime there is there and a lot of other things, but he cannot tell you how much is available. The farmer must ascertain that himself; and I found I did not need potash and nitrogen on my soil when I asked the

land what it needed by checking it and by putting on one plot the fertilizer and on another nothing, and I found my land only needed phosphorus. I did not get any appreciable increase by applying nitrogen and potash on the clay soils. I am not speaking of sandy soils where you may need some potash. In all probability on the clay soils you only need to apply phosphorus; you may need nitrogen. And I would say after you have sown that crop you can tell to the line where you applied the phosphorus. I put on one hundred pounds of nitrate of soda on the grass after it is started up well. That will nourish it until the roots run out and get plant food to grow it. It is one of the best things to put on the grass started on timothy meadows. The land may need nitrogen and I believe in that way by applying at the time of sowing a mixture of potash and nitrate of soda, tankage and fish scrap or something of that kind so that it gradually becomes available.

Another thing we want to remember in applying fertilizer on plowed ground is, that potash and phosphorus become fixed at the point of contact. If you apply on top of the land and don't harrow it afterward, the danger is that it will become fixed at the surface; so you want to stir the soil. I harrow thoroughly to get it down. Fixation takes place within twenty-four hours after application.

I have said nothing about permanent meadows. How many have permanent meadows that you don't plow? I want to see if there are any farmers who have them. Quite a few. I think, my friends, that we ought to have just as few of them as possible. Really, I don't believe very much in permanent meadows, and yet there are farms on which we must leave a certain piece of ground to meadow indefinitely and they must be fed like the pasture field. There is not an acre of ground that pays better on my farm than my meadow lands because they produce heavy crops of clover and timothy hay. We get from twenty to twenty-two dollars a ton for it. Some farmers have meadows they wish to maintain. Those meadows run out for the same causes that the pasture lands run out. They need feed. Some of my neighbors have been following this method: They cut up the meadows immediately after harvest and reseed—and there is no better time to do it if the season is right. The mixture they use is timothy, red top and clover, alsike and red clover. They sow a little commercial fertilizer because they want a good growth and we must get it ready to go into winter. If you have manure you can apply it. The farmers have been flattering themselves that they were giving back to the soil all they took from it, but they were not. They were robbing it every time by pasturing it too closely. This we ought not to do. We have been grazing too closely. When I began the business of farming I began with a mortgage and I went out and bought sheep and turned them into the grass I had left in the Fall. I would have better carried the mortgage longer. You cannot afford to graze your meadows closely. In fact, I don't believe a meadow ought to be grazed. I believe the ideal way of handling a meadow is to take the first crop off and then, unless the other crop is large, let it go back to the soil, covering up the land and making available plant food and furnishing matter to the soil to grow the crop next year. When we cut the hay and haul it off we should put the manure back or apply commercial fertilizer and feed that meadow. We ought not to expect it to do well unless we feed it regularly. I

have a neighbor that top dresses his pasture lands every third year with acid phosphate, two hundred and fifty pounds to the acre, and he has some fine cattle and some fine pasture.

The CHAIRMAN: Have you any questions to ask Mr. Zinn? You have an opportunity to bring out any thoughts you want.

A Member: I would like to ask if you would prefer plowing to harrowing the worn out meadows?

MR. ZINN: Yes, sir; but I take it a great many have pasture lands you do not want to plow at all, as we have in West Virginia. I would always plow if the land was right so that it could be plowed and prepared in that way because you can do a better job and turn under any cover crop like plowing down some rye and increasing the organic matter in the soil. Where you cannot do that, the harrow is the next best thing.

A Member: Would you recommend the clipping of the second crop of clover or let it grow?

MR. ZINN: No; I would not let it ripen the seed. When a plant ripens its seed it has fulfilled its mission in the world and that is the reason the farmers don't get a good stand if they wait until it ripens its seed before clipping.

A Member: Certain of our permanent pasture fields become infested with growing weeds. How do you treat that?

MR. ZINN: Now, my friends, I believe this: I don't know whether our scientific friends will agree. I believe the soil's natural preference is to grow useful plants rather than weeds if conditions are what they should be. Weeds come because the soil often needs lime. I saw that in Ohio. A farmer had sown timothy. The field had been covered with broom sedge before that. At the time of seeding to timothy he took the manure spreader and drove promiscuously over the field and scattered the lime right and left over the field and two years after that I could see the tracks made by the horses in going over the field. There was no broom sedge there. The lime had not driven the broom sedge out. It increased the growth of the timothy to such an extent that the broom sedge was crowded out. If there is enough available plant food in the soil we are not going to be troubled with weeds much.

A Member: Which is the cheapest way to put on lime, either the hydrated, the ground limestone or burned lime?

MR. ZINN: That depends very much on what it costs you. Hydrated lime, my friends, has a wonderful reputation. The manufacturers are doing just like food manufacturers. If I was selling hydrated lime I might do as the others do. Remember hydrated lime is forty-four per cent. moisture. The only advantage over the air slacked lime is the even fineness and in mixing the soil contact will be more perfect. If I can buy the ground limestone at one-half the caustic lime would cost me I would say certainly use the ground limestone all the time. Sometimes we have to ship too far and then we buy caustic lime and sometimes we allow it to air slack and put it on as carbonate of lime. The distance of shipping and

distance to haul has a great deal to do with it. Remember that one ton of ground limestone is the equivalent of eleven hundred and twenty pounds of caustic lime, so figure on that basis the paying price.

A Member: I would like your thought on using red top, which is sometimes considered a weed.

MR. ZINN: I like to use the red top in that timothy because it will make the timothy finer and heavier and will help to hold the weeds down. And then the second reason I use red top and other grasses in the pasture land is, that it furnishes the stock a variety of food and that is absolutely necessary. I am very fond of corn bread, but I am afraid if I had to eat it three times a day for thirty-six days I would get very tired of it; and so it is with the animal. It would soon tire of one food all the time. Did you ever sit on the fence and talk to your cattle? It will pay you. If you sit on the fence and watch them eat. When they are full of grass they will bite off a weed. I want to satisfy that appetite by sowing a variety of seed and I will do that when I sow nearly everything I can get in the form of grass seed on the field.

The CHAIRMAN: Is Dr. Gilliland present? Dr. Gilliland is to make the Report of the State Veterinarian, but he does not appear to be present so we will take up the next subject on the program, "The Pennsylvania Stallion Law," by Dr. C. J. Marshall.

DR. MARSHALL: Mr. Chairman and Gentlemen: I was requested some time ago to give you something on the subject of the Pennsylvania Stallion Law. I wondered why they asked me to speak on such a subject. I know there are a great many here that know a good deal more about the Stallion Law than I hope to. I have had an opportunity to be interested in it a little. I think in January, 1908, the Pennsylvania Stallion Law was instituted in this State and it has been making good progress since it was in effect. Dr. Gay, the man who has had charge of the work, is very much interested in it and I doubt if we could get a better man in America to take charge of the laws of this character. So far as I know, there has been very little trouble in instituting this law or in the workings of it. There has not been time enough yet to reap all the advantages we should from it. I imagine in the future you will appreciate it much more than in the past.

I have prepared a few remarks here. It is well to get down the subject and if you will excuse me I will read them:

THE PENNSYLVANIA STALLION LAW

By DR. C. J. MARSHALL, *State Veterinarian.*

The stallion law has now been in operation for three years and in that time has been able to demonstrate both its strong and weak points. That much good work has been accomplished can readily be shown, and that amending the law would still better the horse breeding industry is a foregone conclusion.

Primarily the law has been of great educational value. Heretofore in many instances farmers bought stallions without considering whether they were registered or not. As long as the seller made a statement to the effect that a horse was pure bred and registered the buyer was satisfied. Advertisements such as "An Imported English Shire Stallion Registered in France and America" (this fact was actually printed on a stallion poster) demonstrates that the owner evidently did not know what pure bred and registry meant. Now, however, they realize that in order to secure a pure bred license they must have an authorized pedigree registry certificate, and they have become far more careful.

The requirement of the law which states that copies of the license certificate shall be posted prominently on the inside and on the door of the stable in which the horse is stood, and that a copy shall be incorporated in all advertisements is a good means of preventing misrepresentation by the stallion owners themselves; because the license certificate differentiates distinctly, in large type, between pure bred and grade. Thus, a prospective breeder immediately on viewing the license certificate can see whether or not the stallion is of pure breeding and registered, or whether he is a grade.

I do not believe there is any business in which there is more trickery than in horse dealing, and for that reason it is necessary for breeders to use an extra amount of caution. Many men who are otherwise honest do not hesitate to deceive even a friend when a horse deal is being negotiated. Fraudulent pedigrees and pedigrees from unauthorized associations were a very common occurrence but now, knowing that they will not be accepted as a means of securing a pure bred license they are less frequently found.

The Bulletins issued by the Department on horse breeding topics have also been a great help to stallion owners, in fact horsemen in general. However, they have no immediate bearing on the subject of this paper.

The stallion law has encouraged breeders of good horses by giving them protection and they have in consequence been buying more pure bred stallions than heretofore. To show the actual increase let us take the number of pure bred horses licensed in 1908 which was 666, then in 1909 there were 823 licensed, an increase of 10 per cent., and in 1910 there were 909 licensed, an increase of 10 per cent., while the grade stallions have also been increasing the percentage of the increase has been markedly less. In 1908 there were 1333 grade licenses issued, in 1909 there were 1427, an increase of less than 7 per cent., and in 1910, 1474 grade stallions were licensed, or an increase of only $3\frac{1}{2}$ per cent.

The ratio of increase has been about three pure bred stallions to every grade. Not only have the pure bred stallions brought into the State increased in numbers since the enactment of the stallion law, but the horses have been of a better type, especially among the draft stallions.

The present stallion law is good so far as it goes, but under its provisions it cannot go far enough. The owner's affidavit is a bad feature, but it is impossible to demand that each stallion owner have a veterinarian examine his horse, as in some counties they have no qualified veterinarian. The only means of being sure that a stallion is up to standard is to have a commission appointed which shall ex-

amine all the stallions in the State, similar to the way it is done in New Jersey. This would be an ideal means of having all horses passed upon in a uniform way. As it is, there is too much difference of opinion as to just what constitutes a stallion of the best type. This inspection would also bring to light all valueless grade stallions, which although technically sound, are of such inferior breeding, type and conformation that they are a detriment to the horse breeding industry.

A stallion would not necessarily have to be examined each year he is in the State. This could be modified; perhaps stating that all stallions had been passed by the commission and had attained the age of say 10 years would be exempt from further inspection.

Then, too, instead of issuing merely three forms of license certificate, namely: pure bred, grade and cross bred, it would be better it seems to me, to have some distinction between pure bred stallions at least. There should be a class for pure bred stallions of the highest type, second best and so on. This would give the mare owner a better idea of the worth of a stallion. As the law now stands any horse that is properly registered with an authorized association, can secure a pure bred certificate; this puts a prize winning stallion in the same class as a horse, which (although by the letter of the law is entitled to the best certificate) is inferior as to type and conformation. These kind of licenses, however, could not be issued unless a personal inspection were made by the authorities in charge of the enforcement of the law. If the commission before mentioned were a fact, of course, it could also take care of classifying the various stallions.

The Pennsylvania law is one of the few exceptions, in not having a lien clause in it. Eight states, and one of them is Pennsylvania, have no lien on the colt or mare and colt, for a stallion service fee. A clause of this kind in the law would not only encourage breeders to buy better stallions, knowing that they would be able to collect the fee agreed upon, but also, would be an excellent means of enforcing the law. If a lien clause were incorporated in the stallion law, stating that only such stallion owners as had complied with all the requirements of the law, could avail themselves of the right to collect fees under that law, it would naturally make all stallion owners very desirous to fulfill all the provisions of the law.

Much criticism is made in regard to the fact that there is no specified list of hereditary unsoundness in the law. This fact, however, was gone over in detail by your committee at the meeting two years ago. Since that time Dr. W. L. Williams, of Cornell, read a paper at the annual meeting of the Pennsylvania State Veterinary Medical Association which confirmed in every sense of the word the report made by your committee on this subject and brought out more forcibly the importance of allowing great leeway in the subject of hereditary or transmissible unsoundness or disease. There appears to be no condition in the list of those usually considered as hereditary unsoundness without illustrious exceptions.

After all the subject of type and conformation appears to predominate most prominently in the subject of transmission, and while we would not recommend prospective buyers to purchase stallions that are afflicted with blindness, ringbones, spavins, navicular diseases, cryp torchidism, roaring, heaves or sidebones or breed to such

sires or dams; yet where horses develop these conditions during service, the law should deal with them leniently and clients should not be too critical.

The CHAIRMAN: Is there any question to be asked or discussion on the subject before us?

A Member: I would like to ask if there is any objection to breeding to animals after they are ten years of age?

DR. MARSHALL: This gentleman asked me once tonight if there is any reason why we should not breed to a stallion that developed roaring after ten years old. I don't think there is. I don't want to be understood as recommending you to breed to roaring horses, but there are a great many good horses that develop roaring and I don't believe transmit it. There are a great many cases in which we get information in and where the breeders have investigated the question of transmission of roaring it was the exception where they could find a case where roaring had been transmitted.

These good draft horses that in the winter develop asoturia, they are horses of good conformation, good condition and good age, and every condition favorable, are what we want and the best kind of horses. They develop asoturia and they usually die with it, but I don't think that is any argument why we should not breed for that conformation and try to breed for that class of horses. I would say that it is not a dangerous experiment to breed to horses that develop roaring after ten years of age.

MR. NORTON: Would you recommend cutting out the grade stallions?

DR. MARSHALL: I would as fast as we could get pure breds to take their places. I don't think I would recommend cutting them out at once.

MR. NORTON: The reason I asked that question is that there are a great many owners of stallions come to the conclusion that in order to protect the pure bred and thorough bred horses the grade horses should not be allowed to be registered.

DR. MARSHALL: I think we should encourage in every way the pure breds and thoroughbreds and as fast as we can adopt that kind of breeding. I think it better to get rid of grades. I don't see any other way we can get at it.

A Member: Isn't it a fact that we have many grades throughout the Commonwealth that are better than thoroughbreds?

DR. MARSHALL: I think that may be true.

A Member: Why would you advocate a measure that would cripple that feature of the industry?

DR. MARSHALL: Well, I don't know that it would cripple it. I think it is a benefit to get work horses from pure bred sires rather than from grade sires. We should get better horses. I don't see or understand that that recommendation would cripple the trade.

A Member: Well, it would have more or less effect upon it if we go so far as to prevent such a stallion from being registered.

DR. MARSHALL: If I was going to breed horses I would want to get the best I could, and even then I would want the registered horse if I knew he transmitted his qualities.

A Member: What proportion of light, medium and heavy draft stallions are there in the State?

DR. MARSHALL: I don't remember just how those proportions run. There are a great many more heavy draft horses being brought in. There are not so many thoroughbred stallions in the State; and I don't think there are a great many standard bred cart horses. I think the tendency is more for draft horses than thoroughbreds.

A Member: How do you prevent asoturia?

DR. MARSHALL: I don't know as we can always do that. I think we can sometimes. The best preventive measure that I know of is to cut off the feed when heavy strong horses are standing in the stable and always give them a little exercise. Don't leave them standing in the stable on a holiday and Sunday together with the same amount of feed. If you can give them twenty minutes exercise and cut down their feed one-third or one-half I don't believe there is one case out of a hundred that asoturia will develop.

A Member: Doesn't it develop oftener among the class of horses men are allowing to stand to get ready for Spring trade?

DR. MARSHALL: That may be the way in the country, but in the city it is most always horses worked hard every day. Then there comes a Sunday with a holiday ahead or back of it, to make two days that the horses stand in and they naturally get the same feed as when out at work and a great many get paralyzed and usually die. I believe in the country you don't have so much danger of dying. In the country districts they tell me they get well frequently, but in the city we usually have a dead horse when we get one paralyzed in both hind legs. The exercise and cutting down the feed are the best preventive measures.

A Member: Will a horse get enough exercise in a large box stall?

DR. MARSHALL: Not enough to prevent asoturia. That will help some.

A Member: Cutting down the feed is it?

DR. MARSHALL: Has more to do than the exercise. Cut the feed out entirely and big fleshy horses will be better off if not fed at all when standing in than if fed.

A Member: What would you give a twelve hundred pound business horse used in the summer but with not much to do in the winter?

DR. MARSHALL: Give him some hay.

The CHAIRMAN: Are there any other questions? If not, is Dr. Gilliland present? He does not appear to be.

MR. NORTON: I will make a few announcements and then we will call on someone else.

Tomorrow morning the State Board of Agriculture will meet in the auditorium over at the Board of Trade. The Pennsylvania Livestock Breeders' Association will be at the South Chestnut Street Market. The Pennsylvania Dairy Union will meet in this room. The Horticultural Association will meet in the upstairs hall at the Board of Trade. The livestock demonstration will be at the South Chestnut Street Market Hall. Tomorrow all of the livestock meetings will be there in the way of demonstrations of beef cattle, dairy cattle, horses, sheep and hogs; and the steer and hog that are to be used in the meat demonstration Thursday afternoon will be killed tomorrow afternoon, and the demonstration of the cut carcasses will be here in this room on Thursday afternoon.

The CHAIRMAN: Are there any other announcements to be made. If not, I see a gentleman in the rear of the hall I know you will all be pleased to hear from, and that is Prof. Agee, of State College.

PROF. AGEE: I appreciate this invitation. You have a full program this evening and I am sure that you do not want to hear from me at any length. I am glad that associations, representing special interests in Pennsylvania agriculture, have finally arranged to hold their meetings during the same week of the year and at the same point in the state so that all of us may get into touch with each other. This is the way Ohio has done for a long time, and great good has resulted.

I am sorry that I did not hear my friend Zinn discuss the subject of permanent pastures before you this evening. I should not say anything about making sods as I did not hear Mr. Zinn, but you will allow me to emphasize the truth that good, heavy sods are the stepping stones to agricultural prosperity in our state. We can make such sods, and I know that he told you how he is doing so on his own home farm. Pennsylvania is adapted to grass and when we fertilize the hills of this state we can have sods. Our farmers continue to ask about fertilizer for corn. When land is thin and must be planted with corn, of course fertilizers should be applied; but the right place for commercial fertilizers is on the land seeded to grass. We can seed grass so liberally that the sod will make a big corn crop, and we can do this with double profit. When land is seeded down it should have liberal fertilization, and if the sod is left more than one year for mowing it should receive a heavy application of fertilizer early each spring. We have tested this out on thin land at State College, and it is one of the best object lessons our Experiment Station now presents to the farmers of the state.

I presume that Mr. Zinn advocated the use of lime on all soils that are acid. In Pennsylvania, three-fourths of the farming land has a deficiency in lime. If we do not meet the lime requirements, the grass and clover plants are not properly fed, and we do not get the sod that gives pasture any hay; and we do not get the organic matter for the corn crop that follows.

I hope that you expect me to say something of our School of Agriculture at State College, as I can not afford to stand before Pennsylvania farmers and not mention this work which seems to me so important. We have 625 students in Agriculture at the College

now, and next year we will have 800. Many of these men are going back to Pennsylvania farms. Two hundred and twenty-five of them are taking courses that lead only to practical farming, and a considerable percentage of the remainder are planning to own farms and live upon them just as soon as they are able.

A Member: What are you doing for the girls?

PROF. AGEE: We have a Domestic Science School that can train a girl so that she will be as good a home-keeper as her mother is. She can do her work better because she will know more about sanitary laws and more about chemistry. Why should our Pennsylvania farmers send their daughters to schools that do not prepare them for the practical work of life? They have a right to a knowledge of the science relating to home-keeping just as well as the boys have a right to the science that relates to agriculture. We now have only thirty girls in our Domestic Science School.

A Member: You ought to have 625 to keep up with the boys.

PROF. AGEE: Well, you must count upon one or two of the fellows not being the right kind of material for husbands, so we will say that 623 girls would be about right. They should be in the school and we should send them there. The girls have a right to vocational training. It is not square to them to give only such training that they must go into the school room year after year, instead of being fitted for the world's work so that fellows on small salaries can afford to marry. When our young men come to my office to talk about the work that they should engage in, I say to them: "You should look ahead to the time when you will make a home. That is what you are working for no matter whether you realize it or not. It will only be a few years until the best thing in your life will be a home of your own, and you should plan your life work with this in view. If a girl has not been trained to work with her hands and believe that home-making is wholesome work, the question of the college man making a home can not be solved.

I would not have you think that I am pleading for The Pennsylvania State College. I am interested only in the young people who should have the training that will make them worth while in this world, and State College is the opportunity because it furnishes vocational training. If it did not do so, it would not deserve any special consideration.

The CHAIRMAN: Now we would like to hear from Prof. Van Norman.

PROF. VAN NORMAN: It is gratifying to us who have been struggling with educational problems in agriculture to see the interest and enthusiasm that is being awakened in our lines. When I left Indiana and came here five years ago there were fourteen students in the four year course and fifty-two students in the winter course, making sixty-six students that first winter in Agriculture at Pennsylvania State College. Some of my western friends called me a fool for coming to Pennsylvania. I told them that the clouds were gathering, the storm was due; it was going to come no matter who came here. The storm came; the boys followed the storm into the college, and they are still coming.

I believe, looking at the opportunities in agriculture today, that they are big because it takes a bigger man to be a successful farmer today and the next ten or fifteen years than it has during the last fifteen years, and the boy who goes into the business of farming during the next fifteen years with no better training than you who started 25 years ago is not going to get along as you have, because the conditions have changed and the man who meets those conditions must be better equipped. He must have a better knowledge of the principles of agricultural science that underlie the whole field of farm work and must have a better understanding of what they call business principles. The rapid development of this great country of ours has been made possible because of two or three things: One of them is organization and another is knowledge of the cost of production—bookkeeping, in other words; and I believe our successful farmers of the future must know more of how to keep account of what they are doing. I have had men come to my office and say a certain line of work was not paying, but they could not give the figures to prove it so that they might be sure of it. It takes a good deal of figuring and head-work and wise skill to succeed in any business. I believe the opportunities in the business of farming before the young men of our State today are immense.

There is another side to this that has not been brought out. We have in this great State thousands of men who in the years gone by left home and went into the city to study law and medicine and the manufacturing business, and now the good father and mother they left on the farm have gone on and they have inherited the farm and they are writing to us up at the College to send a man down to the farm and bring that farm up in productivity, and we do not have men enough. There are forty-two men in my class today and only four looking for a job. I want one but I have seven men that want the other three, and yet there are thousands of boys in this State of Pennsylvania that could equip themselves to take charge of these farms and get the experience at the other fellow's expense, yet render full value for salary received. That is why I stick to the College—all the mistakes I make the State pays for. If I ever get enough money saved up to buy a farm I will take hold of it. And the fellow that runs the other fellow's farm is going to get a lot of experience more or less at the other fellow's expense. There are thousands of boys competent to carry on these farms and render good service if to their practical experience they will add the training that they can get at our college or some other. You must know boys working out at fifteen to twenty-five dollars a month and many of them at ten dollars a month, who, if they would equip themselves to fill these places could make good, and increase their earning power several hundred dollars per year.

The CHAIRMAN: We would like to hear now from Dr. Marshall, our newly appointed veterinarian.

DR. MARSHALL: I hardly know what to say. I have undertaken a work I know you are all interested in and I want to serve you the best I can. It will be my aim to carry the work on as it has been organized and do the work to the best of my ability. In any way I can assist any of you in doing this, just call on me and see what I can do. I will try to do my best.

I presume you all knew Dr. Pearson and knew a lot about the way the work was organized and you helped him organize it. I know this Breeders' Association is one of the biggest backers that the State Livestock Sanitary Board has ever had and many of the members have assisted the State Livestock Sanitary Board in every way; and if I have to call on you for assistance in the future I hope you will be as prompt to respond as you did with my predecessor.

I do not know that I can say anything more. I will just repeat, that if there is any way that I can help you just let me know.

The CHAIRMAN: Now, gentlemen, I hope you will all take advantage of the show or displays that are upstairs. I know they are worth looking at and examining and studying; and all bear in mind the meetings that will be in session tomorrow morning.

With that, you are excused for the evening.

Wednesday Morning, January 25, 9:00 A. M.

John C. Weller, First Vice-President, in the Chair.

The CHAIRMAN: Gentlemen of the Board, you will please come to order. We are now ready to receive the Report of the Committee on Poultry, W. Theo. Wittman, Chairman, Allentown, Pa.

MR. WITTMAN: This report may be rather short, but I don't want you to judge the chicken business merely by the smallness of the paper. This is my first report.

Mr. Wittman then read his report as follows:

REPORT OF THE COMMITTEE ON POULTRY

By W. THEO. WITTMAN, *Chairman.*

Never, within the history of the State of Pennsylvania, has there been such a widespread and insistent interest in poultry and poultry keeping as has been manifested within the year just past. Probably this is the result, partly, of the ever continuing, upward trend of the already high prices poultry and poultry products demand; thereby calling attention to and emphasizing the profits probable and possible in poultry keeping; partly, of the aggressive and widespread advertising in all classes of current publications, (from the small country weekly up to the highest priced of the biggest dailies and magazines) of poultry and poultry keeping; partly of the widespread awakening in the cities and towns to the desirability of country living, and the idea of these that by keeping a few chickens the entering wedge of a livelihood in the country would be solved; and, partly, by farmers being today more thoroughly awake than ever to the

fact that the biggest money profits are possible in specialty farming as against general farming, and that poultry keeping may be an easy and profitable specialty farming.

The people of Pennsylvania, together with the rest of the country, have spent individually small, but in the aggregate, what must be large sums of money, in buying so-called get-rich-quick "systems" of poultry keeping within the year just past. They have spent this money not altogether because these systems promised wealth unbelievable, but because they really wished information on poultry-keeping and knew of no other source to get it. If the State of Pennsylvania could or would get out an up-to-date and trustworthy bulletin on poultry keeping and give it some publicity, it is more that likely that over a hundred thousand copies would be applied for within a year.

Poultry keepers have been very slow in taking the initiative in securing legislation for bettering the conditions of the poultry industry. But, there is a change of sentiment now going on and it will be a matter of only a few years when poultry people will not only seek, but demand poultry class legislation. One of the signs of this, is the enormous gain in membership within the last year of our National Poultry Association, the Pennsylvania Division of which has alone added, since last September, over one hundred members at ten dollars each. The avowed purpose of this gathering together of the poultrymen is for the purpose of *doing things and getting things*.

An encouraging sign is securing within the year past large appropriations for the encouragement of poultry keeping from various State legislatures, notably, our sister state of New York; and of the Western state, Missouri.

It is to be hoped that Pennsylvania with its large army of out-and-out poultry people and its vast poultry product, both utility or market, and pure-bred or fancy, will not lag behind the other states, but that poultry will receive its due share of fostering care and encouragement from the State and the State Department of Agriculture. To this end, Pennsylvania should have a Bureau of Poultry Husbandry as a Division of its Department of Agriculture. Should have at State College a poultry plant and equipment worthy of the institution and State, and not as now, a plant and equipment which brings a blush of shame to the face of any well informed poultrymen or one, no successful poultryman would be willing to take, rent free.

Pennsylvania includes within its borders thousands of breeders of pure-bred poultry, a few, at least, with a world wide reputation for the high excellence of their stock. Also, held the last year close to one hundred poultry shows, including some of the best and biggest shows in the country, as at Philadelphia, Pittsburg, Scranton, Williamsport and Allentown. The total paid attendance at these Pennsylvania shows must have been upwards of a quarter of a million. And yet the percentage of pure bred poultry on the farms of Pennsylvania is as yet relatively small. Although our dung-hill, mongrel poultry is utterly out-of-date and worthless; and when found on a farm at once stamps the owner as unprogressive and careless, it is my painful duty to report that I found such poultry, within the year, on the farms of some of the members of this Board.

There has been great activity in this and neighboring states within the last year in prosecuting dealers in "Rots & Spots" in eggs and in formulating the general idea that cold storage eggs were bad eggs.

And while Pennsylvania certainly wants the enforcement of the law against rotten eggs, it also wants inspectors with discretion. Cold storage of eggs is the great equalizer of prices; making possible the profitable returns to the producer of summer eggs and saving great loss, and in keeping the price of some, winter eggs, at least within the reach of the working class. It is fair to suppose, that, eliminating cold storage of eggs would send winter eggs to a dollar a dozen, at this period of high food prices.

Where agitation against rotten eggs and cold storage eggs should begin is with the farmer and producer. These two must be made, if necessary, to quit sending fertile eggs to market. To quit this offensive practice without having laws to that effect would be the easiest—and the more profitable. Let us hope, this Board some day, by resolution, will recommend to the farmers and egg producers of this State that they will quit producing and sending to market fertile eggs, or eggs, that are eventually bound to be, rotten eggs.

The CHAIRMAN: You have heard the report. What action will you take upon it? We will take up the discussion of it later.

MR. HUTCHISON: Mr. Chairman, I move this report be received and printed in the journal of our proceedings.

The motion was seconded, put and agreed to.

MR. HUTCHISON: Mr. Chairman, the Trustees of the State College are endeavoring to get an appropriation for a poultry house or plant and a good suggestion in that paper might prompt this Board or its Legislative Committee to aid in securing that appropriation as well as could the State Poultry Association. Now is the time for you folks to aid the College in a substantial way. At the meeting last year there was an item placed in the bill for this poultry plant. We have Prof. Jackson up there, known to you all. He cannot accomplish the work for which he is employed without a good poultry house and good plant and, as suggested by the gentleman from Lehigh, I hope that you will all get interested in that plant and help the trustees secure that appropriation. Now, Brother Wittman, would you take this up with the Poultry Association and see what aid you can give in this work?

MR. WITTMAN: I would not repeat what was said at Philadelphia at the Annual Convention about the plant at State College. In fact, the chicken fellows said that if they were Jackson they would not stay there a day; they could not do anything; they were ashamed when they came there and saw what was there. There was no chance for the poor fellow to do anything. There was a strong resolution adopted to do all we could to help Jackson get an equipment at State College and I hope he will get it. New York State last year voted ninety thousand dollars for a poultry department in their State College. That means that New York State is going to have an up-to-date equipment in that line.

The CHAIRMAN: We will now take up the next report, the Report of the Committee on Livestock, J. L. Patterson, Chairman, McConnellsburg, Pa.

The SECRETARY: I had a letter from Mr. Patterson after I wrote him personally advising him of the meeting and asking him to be ready with his report, and he stated to me that he expected to be out of the State at the time of our meeting but left me under the impression, however, that he would prepare a report and send it to me. I have a letter from him this morning. He is out West and we have no report.

The CHAIRMAN: The next on the program is the Report of the Committee on Wool and Textile Fibres, D. S. Taylor, Chairman, Burgettstown, Pa.

The SECRETARY: Mr. Chairman, if you will go on to the next report I will see whether I have Mr. Taylor's report. I am not sure.

The CHAIRMAN: The next item on the program is the Report of the Committee on Fertilizers, A. T. Holman, Chairman, Millers-town, Pa.

MR. RODGERS: Mr. Chairman, Mr. Holman was my room-mate at the hotel and he was called away this morning before I was up and he had to go home. He laid his report out on the bureau and left word for me to present it and you could do whatever you saw fit with it.

MR. HUTCHISON: Mr. Chairman, I move that Brother Rodgers read the report.

The motion was seconded, put and agreed to.

Mr. Rodgers then read the report as follows:

REPORT OF COMMITTEE ON FERTILIZERS

By A. T. HOLMAN, *Chairman*.

The use of Commercial Fertilizers upon the farms of Pennsylvania is increasing at an enormous rate, more and more each year—eight million dollars worth being used last year in the State. The subject being so broad that it cannot be given justice in a short paper like this. One of the most deplorable facts is that farmers as a rule use fertilizers without knowing the contents thereof.

There are two lame points in the Fertilizer Law that are of much importance. First. The law should compel manufacturers to put but one row of figures on the bags. Second. Farmers and gardeners should be compelled to learn to read the analysis intelligently. It is estimated that not over two per cent. of farmers can read the analysis on the bags intelligently. This gives the manufacturers an opportunity to put two or three rows of glaring figures on the bags so as to confuse the buyer. I have met farmers, when you ask them "Whose make of fertilizer do you use?" will answer, Coon Brand, Wheat and Grass Producer, Harvest King, etc., and never know the name of the manufacturer.

HOME MIXING

Some people seem to think this is the only way to get just what the plants need. It is my opinion that it is a waste of time for the reason that no one can mix fertilizer by hand with the same accuracy that manufacturers can who are equipped with the proper machines to thoroughly mix the different ingredients. Any person who would want only a few tons of a special brand and call the attention of the manufacturers they will thoroughly mix just what you want and at a very slight additional cost. The only home mixing practical on the farm is to buy phosphoric acid or acidulated rock and use on the stable manure. In this way you get a more equally balanced fertilizer from stable manure. However, the value of stable manure depends upon the kind of animals that produced it, and the care taken of the liquid portion which contains more fertilizer than the solids, and it is a deplorable fact that this portion is often left to leak away from barnyards and but little of the fertilizer elements left for the soil. Yet you see good results where this yard manure is put, but it is largely due to the mulching effect of the manure.

A fertilizer has two values,—its commercial and agricultural value. Its commercial value is determined by the market value of its constituents and the cost of labor required in preparing it for the farmers' use. The agricultural value is the increase in quality and quantity it will produce in the crop to which it is applied. Germany claims to have increased their crop productions sevenfold by the use of fertilizers "commercial."

The use of fertilizers is traveling westward farther and farther each year over our once fertile prairies, which years ago it was claimed would never need any feeding in the shape of commercial fertilizers. In Pennsylvania the use of fertilizers has doubled or nearly so in the last ten years. The sections of the State that have the best soil appear to use more per acre than the sections that have less fertile soil. I have experimented along this line and I find there is a limit as to the amount that can be used to a profit.

FERTILIZER LAW

The Fertilizer Law appears to be doing a great good to the farmers inasmuch as the law compels their goods to come up to a certain standard. It is a noticeable fact that there are less stars in the report which were used to indicate that the goods fell below the standard of guarantee.

THE AGRICULTURAL DEPARTMENT

The Agricultural Department is doing good work in connection with its agents who have gathered eighteen hundred and nine fertilizer samples, of which six hundred and sixty-nine were analyzed. Preference was given to those which have not been recently analyzed. The samples analyzed group themselves as follows: 436 complete fertilizers; 8 dissolve bones furnishing phosphoric acid and nitrogen; 1123 rock and potash fertilizers; 47 acidulated rock and phosphates, furnishing phosphoric acid; 24 ground bones furnishing phosphoric acid and nitrogen and 31 miscellaneous samples which group themselves in substance not properly classified under the foregoing heads.

CONCLUSION

Farmers should post themselves in the judicious use of fertilizers and study the analysis. No study will pay better. The land is the farmer's bank, and when the land is enriched through the judicious use of fertilizers the bank account will be increased by which he makes himself a business man of greater use and influence in the community wherein he resides, and will become an object lesson to his neighbors to the extent that we lead, others follow. He who makes two blades of grass grow where one grew before is a public benefactor.

The CHAIRMAN: You have heard the report. What action will you take upon it?

MR. JOEL HERR: Mr. Chairman, I move you that the report be received and printed in the Journal of our proceedings.

The motion was seconded, put and agreed to.

The SECRETARY: Mr. Chairman, I find that I have Mr. Taylor's report.

The CHAIRMAN: We will pass back to the Report of the Committee on Wool and Textile Fibres, by D. S. Taylor, Chairman, which will be read by the Secretary.

The SECRETARY: Mr. Chairman and Gentlemen: I have a letter from Mr. Taylor saying that he is not well at all and he had written a very brief report which he had forwarded. I have not read it. It is in a handwriting strange to me, written by a man not in good health and possibly I may have some trouble to read it.

The Secretary then read the report as follows:

REPORT OF COMMITTEE ON WOOL AND TEXTILE FIBERS

By D. S. TAYLOR, *Chairman.*

Textile fibers may be divided into animal (silk and wool) and vegetable (cotton, flax, hemp and jute and the like). Vegetable fibers may be further divided into soft fibers including manila, icil and istle. The ease and rapidity with which cotton fiber is transformed into yarn and its adaptability to all forms of woven fibers are responsible for the manner in which it has outstripped all other fibers and for its extensive and increasing use.

Wool, of all textile fibers, is one of the most interesting, as well as the most difficult for the manufacturer to handle. The wide range within which the production of wool is possible together with the desirable qualities it possesses for the manufacture of clothing, have made it a most important factor in the history of civilization. Sheep can be raised in any country where warm clothing is needed, (except in Polar regions), and it is natural that the woolen industry

should spring up in primitive communities and among people who are too poor to buy material for their clothing. Therefore, wool growing and manufacturing industry has a place practically in all countries. As a country increases in population, however, the lands must necessarily be utilized for agriculture and the range for sheep is reduced in recent years consequently.

The wool growing industry in Europe and America has not kept pace with that in newer countries. Nearly one-half of the world's present commercial supply of wool is produced in Australia, New Zealand and Argentina. Notwithstanding the fact that the production in the United States is not increasing materially, wool is produced in every state.

Silk. The world's production of animal silk has increased during the last century from 30,000,000 pounds to about 50,000,000 pounds. The leading countries in its production are China, Japan and Italy. The demand for silk has been so much in excess of the supply that ingenious efforts have been made in recent years to discover substitutes, and the manufacture of artificial silk has assumed considerable importance. The founders of this industry in France have sought not so much the formula necessary for the complete combination of chemical elements of animal silk, as to produce an article possessing the principle technical properties of silk—more practically—tenacity, brilliancy, elasticity and aptitude for coloring and bleaching. The approximate annual production of this artificial silk is about 8,000,000 pounds, and the production appears to be equal to the demand.

Flax was among the earliest plants cultivated for fiber, and until the advent of cotton, its fiber was used more extensively than that of any other plant. Prior to that time its cultivation was very general throughout the world. The production of this fiber in the United States is neglected. The area cultivated for flax seed is considerable. The average annual production of flax seed is about 100,000,000 bushels. Of this the United States produces approximately 25 per cent.

Hemp has been cultivated and extensively used for many centuries. In the United States the quantity produced is small, amounting to about 11,250,000 pounds. This represents a remarkable decline in the hemp growing industry in this country, as the production fifty years ago amounted to 149,000,000 pounds.

American production of cotton in 1908 was 6,501,210,800 pounds. Wool and hair from Alpaca goat and other like animals, 311,138,321 pounds. This does not include Mohair.

Sheep. We place the number of sheep fit for shearing in the United States at 41,999,500 head, a decrease of 293,705 from 1909. This decrease occurs in the estimated number of sheep in Western states, which, in 1909 was credited with 28,125,000, and now have 27,500,000, a falling off of 875,000. due largely to the excessive cold and storms of the winter of 1909-10, in the Rocky Mountain region. The sheep in the Southern group of states are estimated now at 1,915,000 head, a loss of 25,000 from the estimate of 1909. There has been an increase in the Eastern and Middle Western states; the number of sheep of shearing age in this group standing at 12,434,500, a gain of 606,295 from 1909.

The wool season of 1910 has unfortunately presented a marked contrast with the active and buoyant year preceding. It has been an unfavorable twelve month for wool growers. The year opened with probably 40,000,000 pounds, or forty per cent. more wool including that in bond, carried over than was the case at the beginning of 1909. The wool market in January, 1909, was quick, with prices fairly firm, but with a marked hesitation among purchasers to contract for new clips. Prices for wool in Pennsylvania for 1910 was about seven and eight cents lower than in 1909 and but little bought until late in the season. Wool values should increase, for several reasons: First, the wool-using population of the world has of late increased more rapidly than wool production. Second, wool's greatest competitor, cotton, has been in short supply and relatively dearer than wool, especially coarse wool. Third, employment at high wages has been so plentiful that the masses have been in position to buy clothes, and clothes made mostly of wool instead of mostly of cotton and shoddy.

Also, there are over 40,000,000 fewer sheep in the world today than there were fifteen years ago, and over 90,000,000 more people using wool. In the consumption of wool the United States is far and away in advance of either of the other great nations, for although somewhat behind the United Kingdom in the quantity required for her factories, all that is manufactured here is retained here for clothing and other uses of our people, and in addition, vast quantities of woolen fabrics are imported from abroad. A large percentage of the wool consumed in the factories of other countries is manufactured for export and sold for use beyond their borders, giving the United States preeminence as a wool consuming country.

The CHAIRMAN: You have heard the report. What action will you take upon it?

MR. GLOVER: Mr. Chairman, I move the report be received and printed in the journal of our proceedings.

The motion was seconded, put and agreed to.

MR. RODGERS: Mr. Chairman, I would like to announce that the Committee on Credentials will meet in the ante-room immediately.

The CHAIRMAN: We will next have the Report of the Committee on Dairy and Dairy Products, Dr. M. E. Conard, Chairman, Westgrove, Pa.

DR. CONARD: Mr. Chairman and Gentlemen of the Board: I am quite a little disappointed that I cannot come to you with a good, full report of the dairy statistics of today, but they are not available, so we have to enlarge on conditions as we have had them for a while. I hope sometime—it will not be long—until we can get the report from the last census which will give us some information which we cannot have at this time.

Dr. Conard then read his report as follows:

REPORT OF THE COMMITTEE ON DAIRY AND DAIRY PRODUCTS

By M. E. CONARD, *Chairman.*

The past ten years have been eventful ones in the dairy business. They have brought about conditions that are very discouraging, in the present state of enlightenment, to the average dairyman.

1. The steady and advancing prices of all kinds of dairy feeds.
2. The scarcity and high cost of labor.
3. The unprecedented demand for beef and veal.
4. Until very recently, the persistent low prices for butter, milk, and the like.

All of which have combined to narrow down the margin of profit to the producers until he has been obliged to live without many of the comforts he richly deserves.

There has been a lack of co-operation amongst the producers of milk and butter, and I venture to say that as a class there is a serious absence of business methods employed. There has been, and is yet, a tendency to look for the remedy only at the selling end of the business. We are too prone to think the fault all lies with the man who buys our product and that he should pay up and share the deficit with us. In fact we feel that of late the producer has not received quite his legitimate share of the cash paid by the consumer, but we must know that the dealers in dairy products are business men and are doing just what we should do to protect our own interest. They are doing business on business principles.

There is no reason why the consuming public should be expected to pay prices sufficient to compensate for our lack of proper comprehension of our responsibility as food producers.

The steady and unprecedented growth of the cities and towns of this great Commonwealth has put such markets within our reach as never existed before, and now it devolves upon us as dairymen to till the soil, select and breed up our herds and to so handle their output as to avail ourselves of these markets. There is an increased demand for raw milk which has resulted in a greatly decreased amount of butter made throughout the eastern part of the state.

It is gratifying to be able to report that there is a growing demand for a better and more thorough knowledge of how to utilize the countless acres at our command so that we may be able to supply this growing demand to our own advantage. The interest manifest at the fourteen dairy schools held during the present winter in almost as many counties proves the prevailing desire for more dairy knowledge that will enable us to cut down the cost of production. Indeed we are inclined to believe that we as dairymen are responsible for

some of the causes of the narrow margin of profit so much complained of for the following reasons:

1. The absence of co-operation and business methods on the part of the producer in selling the products, selecting and raising cows for the herd.

2. The purchasing of too much feed at high prices instead of adopting a more intensive system of farming and producing most of the food on the farm.

3. Because we are nearly all keeping a low percentage of cows that are worse than useless, that are eating up the profits earned by the better individuals of the herd. They can easily be detected by means of the scales and the Babcock test, and if removed from the herd the net profit of the herd will be increased.

We do strongly urge that methods be adopted by those in charge to as rapidly as possible put within reach of all dairymen the opportunity of getting the much needed information and training that will enable them to increase the productivity of their herds.

We are glad to say, in the absence of definite statistics, that we believe that the average per head output of the cows of Pennsylvania has been somewhat increased in recent years. Surely there is a decided increase in the interest manifested in individual butter and milk records, by the more enterprising dairymen and stock breeders. We cannot too strongly urge that the dairy be replenished by raising well selected calves from cows that have proven themselves profitable producers, sired by pure bred sires of families showing good and profitable records. Calves so selected are well worth the expenditure of all the cost of raising them well and the lottery of breeding is largely eliminated.

Summoning up conditions as we see them it appears that there is a decidedly increased demand for dairy products without a corresponding advance in prices paid, and if these conditions must continue as they probably will, it becomes necessary that we study more thoroughly the breeding and selection of our herds, their more economical feeding and stabling. The best and most sanitary methods of handling and marketing their products so that we reduce the cost to the minimum, for there is nothing more certain than that Pennsylvania's acres will, in a few years, be taxed to their utmost to feed the people.

In connection with this report I want to read you an extract from a book entitled, "Education and Efficiency," by E. Davenport, Dean of the College of Agriculture and Director of the Agricultural Experiment Station of the University of Illinois. The book is published by D. C. Heath & Son, Boston, Massachusetts. The extract is as follows:

"AN AGRICULTURE PRODUCTIVE.

"It is not enough that Agriculture should be profitable. In its development it must also become in the very near future enormously productive. How pressing this point will shortly become few people are able to realize, so abundantly have the virgin soils of this country produced in the past, so boundless have been their extent, and so small has our population been almost up to the present day. A little careful consideration, however, will speedily show that conditions in this respect are to undergo a fundamental change in the very near future indeed.

"Under good conditions, the human animal can double his numbers every twenty-five years. By the aid of emigration and despite the ravages of four wars, we have maintained this rate of increase in this country since the

Revolution and the population of the United States has doubled four times in the last hundred years. If we maintain this rate of increase for another century—and something is wrong if we do not—if we maintain this rate of increase we should have in this country a hundred years from now no less than twelve hundred million people, a hundred million of whom should live in Illinois. Under these conditions not less than thirty millions should live in the State of Maine—that is, the population of the entire United States at the time of the Civil War would then be crowded into a single one of our smaller states, and that within the present century.

"For various reasons this ratio of increase cannot much longer be maintained, yet it is the natural rate, and it tends to show us what would come about under normal conditions within a century—and what is a century in the life history of a people?

"Believe me, race suicide if it comes will be due not to a failure of the birth rate: it will be from our sheer neglect to maintain conditions that will insure food for the people. This is the form of race suicide against which we need most to protect ourselves, and it is none too soon to begin. The world has not yet learned how to feed such a population as is just ahead and before the present century is ended the largest single public issue will be that of bread.

"Within the life-time of children born today, scarcity of labor will be a matter of history, and abundance of cheap food will be a tale that is told by the grandfather in his chimney corner dozing in his dotage. We are educating in our schools today a generation of children to live a life that we ourselves have never seen and that history does not record, and we do well if we soberly calculate what their conditions of life are likely to be and mend our methods accordingly.

"We were three hundred years in getting a population of five millions of people, so slowly do numbers pile up when the base is small, whatever the ratio, but we have increased ninety millions in the last hundred years. With such a base and with modern conditions of life, this country can and will produce men at a rate the world has never seen. We can now produce in this country as much increased population in the next twenty-five years as we produced in the whole four hundred years since its discovery by white men, and we can produce twice as many more in the next twenty-five. In fifty years from now we shall have the population of China in this country, unless something goes wrong, and it is the business of agriculture to learn how to feed them. When it has learned this, it will have learned many a lesson the colleges do not now know how to teach."

The CHAIRMAN: You have heard the report. What action will you take upon it?

MR. KERRICK: Mr. Chairman, I move the report be received and printed in the Journal of our proceedings.

The motion was seconded, put and agreed to.

The CHAIRMAN: The reports are now open for discussion. You have heard all the reports. Has any one anything to add to them?

MR. J. ALDUS HERR: Mr. Chairman, speaking on these conditions mentioned in the last report, we have been trying to educate the producer of milk and dairy products. Don't you think it would be well also to try to educate the consumer or the party who consumes, in that he may know the real value of the one or real value of the different products. In our county of Lancaster more than one-half the milk produced—we are getting to be quite a dairy county—is sold at less than three and one-half cents a quart, wholesale. Now, while the tendency is to improve by means of breeding the right kind of cattle and adopting proper sanitary methods, the question today is why must this be with the man who produces the ideal article of milk when the consumer knows nothing or very little of the difference between a good, first-class article and the common article. We have plenty of people in Lancaster, probably one hundred milkmen, retailing milk, selling it from six to eight cents a quart, and I know that some of it is sold wholesale to the retailer at three cents a quart, and I know some that is sold at five cents a quart, whole-

sale, and yet the consumer does not know the difference. Isn't it time that we educate the consumer not only in the qualities of the milk but how to take care of it after they get it?

DR. CONARD: I agree that it is very one-sided, but the consumer is not here today. I am talking to the other people. There is a movement on foot to get that information. I have been asked a number of times to talk to ladies' civic clubs on milk, and I have done it and that leads me to believe that there are quite a number of people who are anxious to know the relative values and the necessary conditions under which milk can be produced so as to be getting a sanitary article and they should be posted and are asking to be posted as to what is their responsibility, what they should do in order to protect their milk supply. I tell them to go out to the farm, make inquiries of the producer, ask for the privilege of going through the barn any time they want to know these conditions, and it brings a closer knowledge to both parties of what the other party wants or can do. That is what we want to do. Brother Herr is entirely right because the other fellow isn't here.

MR. JOEL HERR: The gentlemen here are largely members of the Board of Agriculture and have control or management of farmers' institutes through the State. There are two points that struck me in this report as being important to be brought before this body, and I think they are subjects that ought to be discussed at greater length in our farmers' institutes. The one is the selection and breeding of dairy cows,—the important question of the selection and breeding of dairy cows. It is a matter of neglect. We are allowing our dairy calves to get away from the dairy. The dairyman tries to pick up the best cows he can, and then inst as soon as the calves are ready for the butcher away they go. This indiscriminate slaughter of the heifer calves is a detriment to the dairy product, and as a result of that, milch cows are getting very scarce and they are getting very high priced. We can hardly have the quality of cows we want in the country today because of that indiscriminate slaughter of our calves.

The other thought I want to bring before this meeting is, the importance of a knowledge of the use of commercial fertilizers. Now in the little experience I have had in sampling fertilizers I found a very great ignorance on the part of the farmers and also on the part of the dealers in the value and use of commercial fertilizer and how to use it. I found the grossest ignorance in some localities. One fellow was selling twenty-five one hundredths of one per cent. of ammonia in his goods and he was selling it at twenty-five per cent. The gentleman really did not know any better until I called his attention to it. And so it happens that there are a great many people who really do not know how to use commercial fertilizer. My idea is that commercial fertilizer ought to be used to supplement our other manures. That is the valuable part of it. But the question is hardly ever discussed at the farmers' institute, and I only want to call the attention of the managers of these institutes to getting these subjects to a greater extent on their programs.

MR. GEARHART: I would like to supplement what Brother Herr said on the fertilizer question. It seems to me one thing that will protect the farmer on the fertilizer question is to teach him to know

what he is buying and that we eradicate the surplus printing on the fertilizer sack. For instance, they take a fertilizer that has two per cent. ammonia and two per cent. nitrogen, and then they will give the amount of ammonia in that nitrogen and then go on with a half dozen or more rows of figures, stating so much available and so much unavailable and so much O. K. and so on that the average farmer cannot intelligently know what he is getting. I think that all farmers' organizations should insist that fertilizer manufacturers only brand their sacks with the three figures that actually give the plant food in the fertilizers and then we will know something about it. I have handled fertilizers for years and used them and yet I am sometimes puzzled when I get a sack to know what is there, and I know I know more about it than some farmers.

MR. JOEL HERR: There is just one thought I want to add that I omitted, that is that the A. C. C. goods, the American Chemical Company's goods, are in great variety and some people are prejudiced against them. I am not speaking on that point. I have had people in my travels say, I only want this one goods. I have tried them and know what they are. Going back to another section they will say Lawrence & Clark is just the thing; we tried it and know it; and another will say another brand. While the dealers know the brand by the amounts in each sack, they simply give them by number, 18-2 goods; 10-2 goods, or 10-4 goods, or something of that sort. The fact of the matter is that the A. C. Company has large dispensaries which distribute the goods and the 10-2 goods come out of the same pile, no matter under what name or brand or some other brand, and the fellow who thinks he is getting some other goods he may get the same goods and from the same pile, under different names, with the same analysis. That is true of the average man who buys. He will possibly see the same goods he has under another name. I think these facts ought to be brought to light so that people may know what they are buying.

A Member: The State Inspectors ought to take care of that.

The SECRETARY: Mr. Chairman, the question raised by the gentleman is one that we have been thinking about for sometime and, in fact, a bill was presented sometime ago to the Legislature to settle that question exactly as it was presented by the gentleman, and I think perhaps if we had the power of this large Board extending all over the State behind us we might have no trouble in getting such an enactment, and I would recommend the passage of a resolution like this:

"Resolved, that we, the State Board of Agriculture, recommend to the General Assembly now in session the passage of an act providing that fertilizer manufacturers shall, in placing their guaranteed analysis upon the packages containing their goods, make no statement of equivalents or any other matter than the simple statement now required by law."

MR. C. G. ATWATER: Mr. Chairman, one of the gentlemen has just spoken in regard to obtaining more knowledge in speaking before the farmers' institutes regarding the components of fertilizers. Now there is one question about that that is valuable to farmers' institutes, a knowledge of the needs of the farmers. It seems to me

quite probable that some of the fertilizer people will be glad to send their representatives to talk to the farmers' and perhaps to the farmers' institutes on the subject of fertilizer manufacturing, where the constituents come from and what they are. I have had the pleasure of addressing this Board on the one ingredient, the sulphate of ammonia, and I would be willing to consider the suggestion to talk on that line if it be desirable.

MR. HUTCHISON: I move the resolution offered by the Secretary be referred to the Committee on Resolutions.

The motion was seconded, put and agreed to.

MR. HUTCHISON: I would just like to state that these gentlemen have gotten at the facts in the fertilizer law. When I go out to try a case it is based on what is available, what is there of value to you. When I take it into court I have had that experience that it is what the goods is composed of. It is not these other deceiving parts at all on the sack or package. It is not the revertable in this or in that, but based purely on what value is in the ingredients. That is just what I think the Secretary suggested should be—what amount of these goods is available and not have the farmer guessing when he puts something on the soil that he can draw on five or ten years. It is a splendid suggestion and if there is some effort made it can be accomplished.

The SECRETARY: Mr. Chairman, I would also suggest at this point that it would be very well if it could be incorporated in some resolution that we should require more knowledge as to what the fertilizer is composed of. It is a matter of fact that a very large number of large fertilizer users do not use the made-up material because they cannot be sure as to what that material is composed of. Now, if the user would know the source of the ammonia in that fertilizer, if he would know the source of phosphoric acid, etc., he would know where he is at; but if we don't know these things we hesitate to buy that material.

MR. DORSETT: I was told this week in a farmers' institute that a certain fertilizer company, whose name has been mentioned here this morning and is supposed to be under the control of the Standard Oil Company, is putting into its fertilizer an ingredient from their refineries which is of itself injurious to the soil. If that be true it seems to me the farmers ought to know it and this State Board ought to take some action.

The CHAIRMAN: Can anyone give us any more definite information on this subject?

A Member: What report does the State Inspector give along this line?

The SECRETARY: Mr. Chairman, in answer to that question let me state that there are no State Inspectors of fertilizers. There are agents of the Department of Agriculture employed to gather the samples from all over the State and they are sent to the Agricultural Experiment Station, at State College, Pa., and they are analyzed there. Dr. Frear, who is the chief chemist of the Experiment Sta-

tion. He makes a report before the Board tomorrow and then we can fire this question at him. If there is any truth in what Brother Dorsett says, what he was told at some institute last week, Dr. Frear will be pleased to tell us and if it is true it is something we want to go after and go after it hard. I think that we will put that up to Dr. Frear when he is here tomorrow.

MR. HUTCHISON: I would like to ask the Secretary what program he is holding in his hands.

The SECRETARY: This is just a little bit of the needful. Late in the afternoon yesterday, I think it was just a few minutes before adjournment, the stenographer called my attention to something lying there and I picked it up, as most men would when their attention is called to a thing of that kind, and there was one dollar and with it simply the name and address of a gentleman from York county, George W. Reinhart, R. D. No. 4, York county. Now, I want to know what this dollar is for.

A Member: It must be conscience money.

The SECRETARY: There has been a great deal of that kind of money coming to the State of Pennsylvania recently, but it was not a free-will offering. Is Mr. Reinhart here or can anybody tell me what it is for?

A Member: Mr. Secretary, I was over at the show, over on the other side of the square. I noticed that they were paying a fee of some kind. I believe it was the Horticultural Society receiving a fee of one dollar.

The SECRETARY: Then there is another source, a banquet tonight, and that is a dollar. There are two ways to place that. The Dairy Union are receiving a fee of one dollar. I think the fee is one dollar for annual membership in the Horticultural Society, and you know we have no fee here, and if this is to be a voluntary contribution to the Secretary of Agriculture I shall be very glad to know that. Is Mr. George Barnes here? Well now, this comes from your county, George, and if you can, please find out what Mr. Reinhart intended it for.

MR. BARNES: I did not know they had any money to give away.

The SECRETARY: I will inquire of the gentleman, Mr. Reinhart. I believe he meant that as his dues to this body for the year. There are no dues to be paid here and we want to give the money back to him. This is the State Board of Agriculture. This is a Board created by Act of Assembly, part of the government of the great Commonwealth of Pennsylvania, and, of course, we are not taking any fees from the citizens of the Commonwealth. These other organizations that are in session here are organizations under no Act of Assembly but they are nevertheless doing a very good work and we would be glad to see them getting as large a membership as possible.

MR. BARNES: I will see him this afternoon and mention the matter to him and rectify the mistake.

The CHAIRMAN: Are there any other remarks on any of the reports? Has the Committee on Credentials any report to make?

MR. RODGERS: The Committee on Credentials has a supplemental report to make. Mr. A. L. McKibben, of Beaver county, has been elected a member of the State Board of Agriculture; also, J. S. Patton, of Crawford county, and their credentials are in regular form and they are recommended for membership in the Board together with the others reported yesterday.

The SECRETARY: Mr. Chairman, I notice the next item of business on the program is the election of officers. The thought comes to me that perhaps it would be well to hear the talk of Mr. Martin, from New York, at this time and then close our forenoon session with the election of officers. I do not like to make that motion. If it is thought best, possibly someone will make the motion.

MR. GEARHART: Mr. Chairman, I make the motion that we hear Mr. Martin's talk at this time.

The motion was seconded, put and agreed to.

MR. JOEL HERR: We have not adopted the Report of the Committee on Credentials. The report has been made and we have taken no action.

The CHAIRMAN: We are now ready to act upon the Report of the Committee on Credentials.

MR. HUTCHISON: I move you that the Report of the Committee on Credentials be now adopted.

MR. JOEL HERR: That should include the election of the members; and that the members should be elected.

MR. GEARHART: I rise to a point of information. In some of the discussions here a brother here suggested that these men or seemed to infer that the representatives from the various counties, after being elected by the agricultural societies, shall come here and be elected. That would seem to infer that if this body was so minded they can be rejected as well as elected. I would like to know if that is according to law. It seems to me that if a member is duly elected as the law provides, that it is not necessary to be elected in this body. I rise for information.

The SECRETARY: The gentleman's trouble has perhaps arisen from the use of the wrong word. The organization at home, your county agricultural societies, elect and the returns are sent here, but this body and every other body is supposed to have some control over its own membership. The returns are received; they are passed upon by the Committee on Credentials who report that everything is in regular form and recommend their enrollment as members of the Board. That is right, is it not, Mr. Rodgers? That is your purpose? In your report does it say that everything is regular? I have not listened to that because my thoughts were on other things.

MR. RODGERS: Yes, sir.

The SECRETARY: It is the province of the Committee to examine the credentials and then report to the Board that the returns are regular and that they are properly elected and recommend that their names be placed upon the roll of membership. I would not like to belong to a body of any kind that did not have some kind of control over its own membership, because we do not care to sit in council of any kind with men in whom we do not have full confidence.

MR. RODGERS: What the Secretary of Agriculture just said is what the Committee on Credentials moved yesterday when they presented their first report.

The CHAIRMAN: The motion now is that the persons recommended by the Committee on Credentials be now enrolled as members of the Board.

The motion was seconded, put and agreed to.

The CHAIRMAN: It might be well to call the roll again in order to get the new members on record.

The SECRETARY: I am much obliged to the Chair for that suggestion. I intended to ask the privilege of calling the roll again; and allow me to state that if any of you know of any member of the Board that has been in attendance who is not here to answer this morning kindly speak out. We don't want to omit anybody. We want a record of all who attended this meeting.

The roll was again called and the members in attendance recorded present.

The CHAIRMAN: It has been suggested that we proceed now to the address on "Growing Potatoes," by T. E. Martin, of West Rush, N. Y. Is Mr. Martin present?

The SECRETARY: Mr. Martin was here a very short time ago, Mr. Chairman, but does not appear to be here at present.

MR. JOEL HERR: Let us proceed with the election of officers.

The CHAIRMAN: If there is no objection we will now proceed to the election of officers. The officers to be elected are, first, three vice-presidents. We are now ready to receive nominations.

MR. BARNES: Mr. Chairman, I place in nomination Mr. George G. Hutchison, of Huntingdon county, for the office of Vice President.

MR. HUTCHISON: Mr. Chairman, I nominate Mr. A. J. Kahler, of Lycoming county, for Vice President.

MR. JOEL HERR: Mr. Chairman, I nominate Mr. Peter Gearhart, of Clearfield county, for Vice President.

MR. RODGERS: Mr. Chairman, I move the nominations for Vice President be closed.

MR. BLYHOLDER: Mr. Chairman, I second the motion.

The motion was agreed to and the nominations for Vice President closed.

The CHAIRMAN: How shall they be elected?

MR. JOEL HERR: I move the Secretary cast the ballot.

MR. BLYHOLDER: Mr. Chairman, I second the motion.

The motion was agreed to.

The SECRETARY: Mr. Chairman, in accordance with the instructions of the Board, I cast the ballot for Vice Presidents for George G. Hutchison, A. J. Kahler and Peter Gearhart.

The CHAIRMAN: I therefore declare George G. Hutchison, A. J. Kahler and Peter Gearhart duly elected as Vice Presidents of the Board.

The next is the election of the Executive Committee. There are nine members to be elected. We are ready for nominations.

MR. SHOENER: Mr. Chairman, I nominate Dr. Conard, of Chester county.

MR. HUTCHISON: Mr. Chairman, I nominate Dr. Frank Beck of Blair county.

MR. GEARHART: Mr. Chairman, I nominate J. A. Herr of Clinton county.

MR. HUTCHISON: Mr. Chairman, I nominate Matthew Rodgers of Juniata county.

MR. PERHAM: Mr. Chairman, I nominate Mr. Kerrick of Bradford county.

MR. WARBURTON: Mr. Chairman, I nominate Mr. Naginey of Mifflin county.

DR. CONARD: Mr. Chairman, I nominate D. A. Knuppenburg of Wyoming county.

MR. KAHLER: Mr. Chairman, I nominate Mr. R. J. Weld of Warren county.

MR. BLYHOLDER: Mr. Chairman, I nominate Secretary Critchfield.

MR. JOEL HERR: Mr. Chairman, the Secretary is ex-officio a member.

MR. BLYHOLDER: Mr. Chairman, I nominate Mr. A. P. Young of Columbia county.

MR. HUTCHISON: Mr. Chairman, I move the nominations be closed, and that the Secretary cast the ballot.

The motion was seconded, put and agreed to.

The SECRETARY: Mr. Chairman, in accordance with the instructions of the Board I cast the ballot for members of the Executive Committee for Dr. Conard, Dr. Beck, Messrs. J. A. Herr, Rodgers, Kerrick, Naginey, Knuppenburg, Weld and A. P. Young.

The CHAIRMAN: I therefore declare Dr. Conard, Dr. Beck, Messrs. J. A. Herr, Matthew Rodgers, Kerrick, Naginey, Knuppenburg, Weld and A. P. Young duly elected as members of the Executive Committee.

The CHAIRMAN: Are there any other officers to be elected?

The SECRETARY: That is all the officers to be elected.

MR. JOEL HERR: If we are through with that, I move we proceed to fix the place of the Summer meeting.

MR. GLOVER: I second the motion.

The motion was put and agreed to.

MR. J. ALDUS HERR: Having the pleasure of representing our county, having been a representative for a number of years in your Board, and a year ago our round-up meeting having been at Butler, it seems to me to not be out of place to ask you gentlemen to come to Lancaster, the southeastern part of the State, last year being in the northwestern, and we heartily extend to you an invitation to be with us in Lancaster. We cannot show you the earth. We will try to treat you cordially and welcome you there.

MR. KERRICK: Mr. Chairman, at this time I had thought to extend an invitation to you gentlemen for Bradford. I know that you would be welcome. We have a great city of about six thousand inhabitants. The conditions are good for entertainment and I know that you would be well provided for and we would be very glad to have you come to our town. In talking with my friend here he said to me that he desired the Board to come down to Lancaster. I said to him that that would be consistent with me, but later in the future we would be glad to have this association come to Bradford and I finally consented to second the motion that we go to Lancaster; and now, gentlemen, I simply wish you to bear in mind this invitation and in some near future if you come to Bradford we will greatly appreciate the favor. I now second Mr. Herr's motion.

PROF. MENGES: I am not a member of this Board, but I have been meeting with the Board for a number of years and I would like to put in a good word for Lancaster, our next door neighbor. You know that it is the garden spot of the State and we have never met in Lancaster county, and if there is a county in the State that has been wakened up to the agriculture necessities of our State it is Lancaster county. You know we have always had a notion that the Dutch were pretty hard to wake up, and they are, we admit it; but when once woke up there is nothing to stop them; and I would like to help the movement along and second the motion of Mr. Herr that we go to Lancaster for the agriculture institute next Summer.

MR. BLYHOLDER: When the first two gentlemen spoke I was inclined to feel that I would like to go to Lancaster. But now they tell us they are so wide-awake down there and up-to-date that I feel inclined that we ought to go to some other place and wake them up. We ought to do all the good we can. There is no use wasting our energy where it is not necessary. Therefore I want to extend an invitation to you to meet at Kittanning, Armstrong county.

DR. CONARD: As next door neighbor to Lancaster on the other side, I want to second the motion. I am sure that Lancaster has very good accommodations. I am sure you will see a very beauti-

fully kept agriculture district and you will be within reach of the great power plant and anyone who wants to visit that great power plant on the Susquehanna can have the opportunity to do it by trolley and it is an opportunity to see a well kept agricultural district and I hope you will go to Lancaster.

The SECRETARY: You know there are two sides to every question and I want to call attention to the fact that possibly it might be well to go to Lancaster county to catch some of the enthusiasm that is there.

PROF. MENGES: That is just what I wanted to say.

The SECRETARY: Perhaps it would be best to go there and see what they have and see that beautiful country stretching out like the Garden of Eden in every direction from that beautiful city. There is nothing like getting the enthusiasm.

MR. KERRICK: That was simply the reason I asked the society to come to Bradford. We want the farmers to have the enthusiasm in Bradford.

J. ALDUS HERR: Please don't place your ideals too high.

A Member: Stand up; stand right up.

MR. J. ALDUS HERR: We will give you the best we got.

The SECRETARY: All we want to know is that you mean it.

MR. J. ALDUS HERR: We will stand right up and give you the best we have.

The CHAIRMAN: The Secretary will call the roll and the members will respond, naming the place of their choice.

MR. BLYHOLDER: I will withdraw Kittanning for the present.

MR. KERRICK: Understand my claim is not in for this year.

MR. JOEL HERR: Mr. Chairman, as there is only one place in nomination, I move that the Secretary cast the Board's ballot in favor of Lancaster.

The motion was seconded, put and agreed to.

The SECRETARY: Mr. Chairman, in accordance with the instructions of the Board, I cast the ballot in favor of Lancaster as the place of the Spring meeting of the Board.

The CHAIRMAN: I therefore declare Lancaster as the place for the Spring meeting of the Board.

Is there any other matter to be brought before the Board at this time?

MR. HUTCHISON: Mr. Chairman, I see we have a very distinguished member of our Board here, Governor Beaver. I know we will all be pleased to hear from him.

The CHAIRMAN: Governor Beaver has been called upon. Will you please come forward, Governor.

ADDRESS OF GENERAL BEAVER.

Mr. Chairman and Gentlemen: I am very glad to be with you again. I merely stopped in on my way from one of the other meetings. There is no particular subject for me to speak on that I know of, but I confess that I have been tremendously awakened up since coming to Harrisburg, particularly in view of the horticultural exhibition over at Johnston's Hall. Well, there is no discounting that exhibition, I tell you. I think it is somewhere about ten years ago that we were bewailing not only the business but the decadence of what little horticulture we had in Pennsylvania, and now you go into that great fruit store in Philadelphia where you can pay a half dollar a pound for hothouse grapes and ten cents a piece for Washington and Oregon apples and you will not see anything that will compare in color or quality or taste—because I had one last night—with what you find over here at the show, and if we give attention to the necessities and demands of Pomology in the way of soil and treatment, we are likely I think to stand at the very head of the apple producing regions of the United States. There is no reason why we could not be, for we produce just as good and better apples than you will find at the big fruit store in Philadelphia that were raised in California or Oregon.

I was talking with Mr. Tyson, one of our great growers, and I asked him whether he sold his apples at wholesale, and he said, no, he did better than that; that he got his price; that he had a market for every bit of his product by sending boxes directly to the consumer; and, of course, that is the thing for the producer to do when he can. But I am very well satisfied that there were Winesaps, Spies and old-fashioned Rambos which appealed to me as much as anything I have seen and if they went on exhibition at that great fruit store in Philadelphia alongside what they consider the choicest products of the apple countries of the United States, that they would stand up with all of them as to quality, appearance and taste and as to the mode of packing. After all, that is the great appeal to the eye. It occurred to me that the Italian's method of spitting on the apple and rubbing with his kerchief was apparent on some of the boxes, but on the whole I think they were pretty fair.

But there must be discrimination. This can be overdone by planting your apple trees in the right soil. The soil specialists tell you now they can put an augur in the ground and pull it out and tell you not only to plant apples but what kind. They say, there is the place for the Baldwin apple and you can see from the exhibition over there that there are soils that give color to the Baldwin, its natural color, its distinctive color; and that there are soils which fail to give that color. I saw apples there that were as distinct in color as it was possible to be and yet both labeled Baldwins. One of my friends gave me a Perry county Baldwin grown on a farm that probably cost him ten dollars an acre and I suppose he would not take one thousand dollars an acre for it now if he has it covered with Baldwin apples and the product is equal to the sample which he gave me last night. Indeed I heard of a gentlemen this morning—I could hardly grasp

it—who had paid fourteen hundred dollars for an Adams county farm and had refused fifty thousand dollars for it the other day simply because it was covered with apple trees. It was in the apple belt. It was producing and ready to make him—well, at least, probably ten per cent. on what he had held his farm at and four hundred per cent.—more nearly one thousand per cent. on what he had invested. So it is worth while for Pennsylvania to persevere.

We are just on the verge of the revolution in our horticulture product, and particularly with that portion of horticulture which relates to Pomology, and I hope to see the time come when I will have to take back all I ever said about Pennsylvania not being equal to New York in regard to its fruit products. At the time it was said, of course, it was true but it is not true today and I am more and more convinced as we see the results of our experiments and the good work that has been done by the Department of Agriculture and co-operated with the State College in its extension work, I am more and more satisfied that we are on the very verge of a complete revolution and a successful revolution along this line. And it is true that horticulture in its other branches is just as important, and we have the soil that will make it just as successful. We have the best home markets in the world. Our census shows that it is, that we have in Pennsylvania the best home markets in the world. We have more cities of twenty-five thousand inhabitants and upwards than any State in the United States. New York has a number of cities that are larger than the majority of our cities, but we have more cities that are utterly dependent upon the region immediately surrounding them and they give to the regions surrounding these cities splendid home markets. And so we want to specialize not only along the line of Pomology but all along the lines of horticulture. We bring our lettuce—I am eating lettuce at home that probably comes from Florida or Georgia or the extreme South, probably from some islands that belong to the United States. We can raise that right here in Pennsylvania and right now. A little bit of glass will give to our farmers and, if they choose to do it as they always have been doing it heretofore—leave that work to the wives and daughters, it would give a splendid opportunity to the women to earn their pin money simply by the raising of lettuce under glass, and this is always not only a good marketable vegetable but an extremely wholesome one; so that it is a good thing for the community to meet the requirements of these cities, and much depends upon the immediate outside for the variety in their tables and in the wholesomeness of our food.

Heretofore it has been considered the thing for the farmer to raise the wheat that would produce the largest number of bushels to the acre and that has been considered the point to reach. If I can produce one hundred bushels of wheat to the acre it is better than thirty. That is not so. The millers come now and say no; what we want is the wheat that will produce the most nourishment and that will give the best flour to the consumer. After all the consumer is the ultimate man that we must look out for; and the millers say, We don't want your wheat; it don't produce the most and best flour. We must have the wheat that under modern conditions will give the best to the consumer, and so we discover that some of the wheats that would seem to be the best for the farmer are not the best for the consumer, and therefore we must try to meet the conditions that the

consumer imposes upon the market. This point was strikingly and vividly brought to the attention of the Research Department or Investigating Department of our School of Agriculture at State College when they listened very sympathetically to a proposition of the millers of Pennsylvania to establish a Department of Engineering, called Mill Engineering, at State College; that they would erect a mill and that we would carry on a line of experiments there that would tell the farmers of Pennsylvania what wheat would produce the best flour for the consumer and would give the most bread and best bread to the man that ate it. And you can see, of course, without any argument or without any appeal that that is sense. We must rise and advance in the production of all our articles which we combine under the general term of agriculture; we must cater to the consumer, and the better we come to him and the better products we offer to him the greater the demand for our products. Of course, you see in the Ladies' Home Journal and in these high priced advertising periodicals the Golden Flour. You see the products of Minneapolis and all other great flour-producing regions displayed in very extensive and very expensive advertisements. But after all there is no reason if we put the same amount of brains into our wheat products why we should not produce wheat in Pennsylvania that will make just as good flour, just as nourishing, just as beneficial and healthful articles of food as they do anywhere in the world, and so we must go a step further.

We have been going wrong in the production of our wheat. It is not the wheat that will produce the largest number of bushels to the acre, but it is the wheat that will give the largest amount of nourishment to the acre that we want to raise in Pennsylvania and the millers are beginning now to measure the price of wheat by the quality of the flour and, of course, that is the thing they have to do and it has come ultimately upon the farmer to do that thing, to take to the miller, to our own men who grind the wheat and furnish flour to our people, the wheat that will give the largest amount of nourishment to the man and woman and child who eats it. And we can see from just this little illustration that I have used the variety of our agriculture and the variety of demand which is being made upon the agriculture now for the highest products, for the largest amount of science that can be injected into it. Because this is largely a question of chemistry after all. When the flour is made, the chemist tells you what is in it, what the fundamental elements of it are and how those elements are to be used by the digestive organs of the human body to nourish the blood and send it to the heart and to the extremities on its way of helping man and making him the best animal that God has made. And after all that is just what we have to help to do and he is the man we have got to feed and we must feed him in a way that his body will be the very best for the services of his Commonwealth and his Country and of the best illustrative value to his neighbors for right living; and, of course, the farmers have a good deal to do with that. And so we are not only in co-operation with God in making man as perfect as he can be, but are in co-operation with the Commonwealth and country in making man as productive as he can be, and this, of course, is the ultimatum.

A Member: How about the corn?

GENERAL BEAVER: We will increase that when you want to feed your steers and your horses.

The Member: I mean the Corn Exhibition.

GENERAL BEAVER: Well, of course, that is a marvelous exhibit. I went through it with a great deal of interest last night and, except our Brother Bayard's contribution which seemed to me to be a little nubby, the rest of it was very fine.

The SECRETARY: General Beaver has been giving us a little outline of what we have been doing in the past and the general progress that we are making and prophecies still greater progress in the future, and with it all we must reach the conclusion that we must have better roads, as we are going to have better and more products to get the products before those we have in our small cities in the Commonwealth. We must reach them and we have great distances to go, and I know you will all be delighted to hear that there is going to be a new departure that is going to start right here, one of the things that is destined to make more progress on the road question than anything heretofore. Tomorrow afternoon at four o'clock there will be a meeting of all the interests combined, all the people, here in the large hall upstairs. The Pennsylvania Railroad, I believe, proposes to furnish a train that is to be at the disposal of the State College for some two or three months. This train will be manned by the State College with people who are thoroughly competent to talk upon the question of making roads. The proposition is to take up the question just as they find it out in the country. They are going to tell the supervisors all over the country how to do the work and how to make the country roads and how in the end that shall work out the system of roads being constructed by the State. This is work in which we are all interested and I wanted to make the announcement at this time because we have a pretty full attendance.

The CHAIRMAN: We will now have an address on "Growing Potatoes," by T. E. Martin, of West Rush, N. Y.

Mr. Martin then delivered his address as follows:

GROWING POTATOES

By T. E. MARTIN, *Syracuse, N. Y.*

Mr. Chairman and Members of the Pennsylvania State Board of Agriculture: There is a difference between having something to say and having to say something. I believe, however, that I am in the last situation this forenoon. I am a farmer and I am going to talk to you from a farmer's standpoint.

I have just a few statistics here on potatoes. There are six states that produce one-half the potatoes of the United States. According to the statistics, there were 328,787,000 bushels of potatoes produced

in the United States in the past year, of which New York produced 44,676,000 bushels, an average of 102 bushels an acre; Michigan, 34,424,000 bushels, an average of 104 bushels to the acre; Pennsylvania, 27,896,000, an average of 88 bushels per acre; Maine has an average—I won't read the rest—of 210 bushels to the acre; Wisconsin has an average of 95 bushels to the acre; and Ohio has an average of 82 bushels to the acre. So these are the six states that produced one-half of all the potatoes in the United States, ranking in total production in the order named.

Our farm is located in Monroe County, New York, at a little place called West Rush, 13 miles south of Rochester. We bought this place in 1892. It was a fair farm. We knew that it must be drained. We did not have the means to drain it at that time. There was a \$3,000.00 mortgage on the place with 5 per cent. interest. In 1894 we took up drainage and we have expended \$2,500.00 and it has paid and paid several times over. I just want to say here that if you have excess water in the soil you cannot achieve the best results in potato growing. Our soil is a gravelly one principally. We have some light land. It is practically loam. We have a little dead sand and perhaps five acres of clay in seven or eight different places on the farm in little patches here and there the largest patch has possibly two acres. This is a brief description of our place. It has an elevation of about 550 feet above sea level.

Plowing is a very important point in bringing up soil. Good plowing is an art. I did not come here to instruct your farmers in plowing, but somehow there are many farmers that don't plow their land properly. We like to plow our furrows on edge, at an angle of about forty-five degrees, so that they stand up, for the reason that where the furrows are placed on edge we can get better mixing of the soil than by the furrows being upside down. Where the furrow is inverted or upside down there is very little mixing of the soil. And here are several points: One of the points is if there is organic matter plowed under and that furrow turn over flat, capillary attraction will be shut off between the sub-soil and the surface soil, and this is of the greatest importance especially if the season comes dry; and also by keeping these furrows on edge at an angle of forty-five degrees in the tillage of the field you can bring the different soil particles in contact with each other better than if the furrows were turned upside down. We have gradually lowered our plowing depth from six to ten inches. We plow ten inches for our work and we like that depth. Here is the surface of the soil. The manure and clover rotting down there will be more plant food in the first two or three inches of the surface soil than in the lower inches of soil. If these furrows are turned up on edge you can bring the different stratas and soil particles into contact with each other in the tillage. Sometimes I think about it in this way: I go to a meeting or come in contact with good people and thereby feel strengthened and improved. Then again I go to some other place and came in contact with immoral people with low ideals and I wish I had stayed at home. And so it is with the soil particles coming into contact, those of the surface with those lower down. There is an action set up by the heat, light and atmosphere and so on and that action is of importance to the unlocking of plant food.

We like Fall plowing. We have a short rotation of crops, 18 acres of each—wheat, clover and potatoes, a three year rotation. We grow late potatoes and we must necessarily get the potatoes planted early in Spring so that we can get them off in time in the Fall to sow the potato ground to wheat and then it is too late many times.

A Member: Did you have any experience with the disk plow?

MR. MARTIN: No, we don't use the disk plow. It is a good tool. We have a good many stone. I guess it would work. One of the tools we have is the double acting cutaway harrow. I am not advocating one tool over another but the tools that may be mentioned we like and they do the work well for us. This Clark double acting cutaway harrow has a double set of disks, a row of disks ahead and a row behind. The disks ahead throw the dirt out and the disks behind throw it back without ridging the surface much. We think it is a great tool for breaking and cutting up the soil. The preparation of the soil itself is something that should not be overlooked with the cutaway. We go straight with the furrows the first time over; the second and third times diagonally each way, and the fourth and last time with the disk harrow is straight across. That makes four disc harrowings the field received. It is a four horse machine, has 28 16-inch disks, and cuts seven feet wide.

A Member: Do you use that disk also for sowing wheat in the fall?

MR. MARTIN: Yes, sir; we use it after the potatoes are harvested in the Fall. Twice over and level with Spring tool harrow.

A Member: You don't plow again?

MR. MARTIN: No; we don't plow the potato ground in the Fall.

A Member: Do you ever disk before plowing?

MR. MARTIN: No; we do not, but I haven't anything against it at all. I think it would be a good thing. I will take that up a few moments later.

Just after the fourth disking we run a spring tooth harrow over to level up.

A Member: I don't know whether you use a jointer when you plow?

MR. MARTIN: Yes, sir; we always use the jointer on the No. 99 Oliver plow. We level up with the spring tooth; and then the fertilizer is applied. Sometimes there is one application of fertilizer between the third and fourth cutaway harrowings and worked in well and incorporated with the soil. It is a good plan to apply the fertilizer right after the first cutaway harrowing if you can.

Now, my position on the fertilizer question is this: I would not use an ounce of commercial fertilizer until I had first drained the land, given the soil the thorough preparation it ought to have, made clover grow luxuriantly and judiciously made, saved and applied the home manure supply, and then if I wanted mere fertility and could make commercial fertilizers pay I would use it; but I would not use it, until that time.

One of the best means of getting and making fertility available on the farm is through the use of clover. We have practiced for four years past a sort of novel way of restoring our land to its original production. We mixed in 25 per cent. alfalfa with our clover seed, in this rotation which requires three years to go over the farm. Let this represent fields Nos. 1, 2 and 3. Suppose we start this on field No. 1 in 1910, sowing clover and alfalfa on the wheat ground in the Spring. We mix in the clover seed, one-fourth alfalfa. It requires three years to get once over each field, 1910 for field No. 1, 1911 for field No. 2 and 1912 for field No. 3; and then beginning the second cycle 1913, with these same fields Nos. 1, 2 and 3 we use fifty per cent. alfalfa. 1916-1918—3 years, 75 per cent. alfalfa—1919, all alfalfa. Suppose we have ten acres and we wish to apply one-half bushel per acre, we would mix in the five bushels of seed, two and one-half bushels of alfalfa and two and one-half bushels of medium red clover well mixed; then sow it together. We watch for certain conditions as we like to see the soil dry, and well checked up, taking the afternoon, because the soil is checked up more in the afternoon than in the morning. It is dryer and there are no wet leaves having the dew on them. We sow the seed with a broad-caster. Considerable seed goes into the checkings. These checkings ought not to be too deep. If too deep the seed gets into the ground too deep and will not germinate. The next morning we go on the field with a lever set, 3 section, spike tooth harrow, teeth straight up and down. We can harrow fifteen acres in half a day. We like to harrow the seed into the ground. I believe the clover and alfalfa seed should be covered up just as much as garden seed should, and we consider on our place that this is one of the vital points in getting a good stand of clover.

A Member: Do you sow timothy with the wheat in the Fall?

MR. MARTIN: Yes, sir; two quarts per acre at wheat seeding time.

A Member: Do you disturb the timothy?

MR. MARTIN: Yes; harrowing in the clover and alfalfa seed does dig it out some but if a clover or alfalfa plant takes its place I am delighted.

These alfalfa roots (holding up roots) show what alfalfa is doing on our farm. These roots have been carried around in my grip for several weeks and while they are broken off at about two and a half feet still they show what they have done. They are larger than the red clover roots and go deeper in the soil as this small one shows. It is four and one-half feet long now and has probably gone down into the sub-soil two feet further than its present length, judging by the size of the root where it is broken off. Now such roots will give us some hay. Understand the alfalfa seed is mixed in with the clover and sown in the Spring and harrowed in, and wheat harvested in July and in August the wheat stubble is clipped and next year the first crop of hay is cut. We try to get the hay in the barn by the 25th of June, though sometimes it is the 4th of July; but by the 25th of June we like to get it in because it is better food, more nutrition in it. By early cutting you will not get as large a crop, as much in weight; but the second crop will come on at once and there you will

gain. The second crop is cut about the 1st of August and the hay brought in and not left on the soil. The third crop is cut about the middle of September and left on the ground. We prefer to cut it because the next crop comes on and by cutting it you destroy the weeds and it gets back to the soil where it is in shape for plant food material quicker than otherwise.

A Member: How much seed do you use?

MR. MARTIN: We are sowing one-quarter bushel medium red clover and one-quarter bushel alfalfa seed per acre. Best seed obtainable. Clover is cheaper than fertilizers.

A Member: Will the clover sown with the alfalfa ripen with your alfalfa?

MR. MARTIN: The alfalfa comes a little earlier. We commence cutting it when the time is right for alfalfa, about the 15th of June in our section. Alfalfa makes more and better hay and soil is gradually inoculated.

A Member: Don't you find trouble in curing it then?

MR. MARTIN: Yes, there are seasons that it is more difficult to cure it. Sometimes we cannot cut it at that time owing to unfavorable weather.

A Member: Do you use any fertilizer?

MR. MARTIN: We are going to cut out the fertilizer. We have gradually increased to 1900 pounds of 4-8-12 per cent. home mixed fertilizer that costs \$32.00 per ton; but we are lowering it down now to 800 pounds per acre on potato ground. We expect the time is coming, and we feel sure the time will soon come when we can cut it out entirely, when we go from clover to alfalfa complete. That is it will require twelve years to complete this cycle, 1907-1918, from twenty-five per cent. alfalfa to one hundred per cent. alfalfa.

In traveling around New York State I come across various brands of fertilizer, and up in the northern part of the State I came across this advertisement. I will just read it: "Analysis, ammonia, 13 per cent.; potash, 36 per cent.; phosphoric acid, 33 per cent." I figured that out. The ammonia would be worth \$39.00; potash, \$32.40 and the phosphoric acid \$29.70 a ton, total for the ton, \$101.10, and that fertilizer was offered for \$10.00 a ton. Now, that is one illustration of the fertilizer situation. When a person practices home mixing he informs himself; he gradually becomes enlightened on the subject, and he hardly is aware of it at the time, but he gets enthusiastic in studying and figuring it out. I remember my wife used to say to me: "What in the world do you stay up nights for, figuring so on the desk here covering that paper with figures," and so on. And I told her I was figuring out fertilizer analysis and forgot myself. A person will get interested in the problems and soon arrives at a point where no fertilizer agent can fool him. It is not difficult to mix fertilizers. It costs about fifty cents a ton to mix, and a man can mix it as good as any fertilizer company can if you take the pains, the saving will range anywhere from \$2.00 to \$8.00 a ton and you get better goods and know what you have, avoiding paying freight on a lot of stuff from New York that is of no value to you. For instance, if you

wanted potash on your place it would be cheaper to buy it in the form of muriate or sulphate of potash rather than in the form of kainit and similar goods on which you would be paying freight on a lot of useless stuff and getting only a small per cent. of actual plant food. Here is another one that I came across in the State of New York: "Guaranteed analysis, 8 phosphoric acid, 4 potash, and sold for \$15.00 a ton. That fertilizer was worth to the farmer \$11.80. In that ton were 491 pounds of filler. We don't need a filler. We can put that in at home. What I would recommend for potatoes would be, say, 1500 pounds rock phosphate, 14 per cent., and 500 pounds muriate of potash; and this would make up an analysis of $10\frac{1}{2}$ phosphoric acid and $12\frac{1}{2}$ potash, and would cost somewhere about \$20.00. An application of 500 lbs. to 800 lbs. to the acre is a good one. As I said before, I would not invest in fertilizer until I had worked out the other problems first. By all means test out the fertilizer and use it intelligently.

A Member: You would not buy nitrogen?

MR. MARTIN: It depends. In buying these commercial goods for home mixing you have them separate. You have the nitrate of soda, the rock and the other forms of nitrogen, phosphoric acid and potash separate and I would test them down through the field. For instance, I would take the grain and fertilizer drill after the potatoes were planted and apply to a strip of three rows of potatoes to nitrate of soda and skip three rows; then apply 14 per cent. rock to three more rows and skip three rows; then try a strip to potash; and let the comparative results determine the profitableness of the respective fertilizers. On our farm potash pays well and that is the reason we are using potash so heavily. This came about no doubt by growing potatoes in short rotation. There is no way of knowing absolutely about the needs of our own land by trying it out this way. Nitrogen I would grow on the farm if I could. If it paid to purchase I would buy it. Clover is one of the plants that will bring up from lower depths the leached and lost potash and phosphoric acid and gather nitrogen from the atmosphere, which contains over \$1,000,000 over every acre of land.

A Member: Did you ever have any experience with vetch?

MR. MARTIN: No, sir; I think we are out of its proper home. We are too far north for crimson clover.

We grow just one variety of potatoes, Sir Walter Raleigh. I do not say they are the best variety. They do well in our section. In a comparison between the Green Mountain and the Sir Walter Raleigh on one farm the Green Mountain beat the Sir Walter Raleigh and on another farm the Sir Walter Raleigh beat the Green Mountain.

A Member: How about the Irish Cobbler?

MR. MARTIN: We don't grow that. We don't like a red potato for our trade.

A Member: But they are white.

MR. MARTIN: You see, that is what I know about the Irish Cobbler.

A Member: It is an early potato.

MR. MARTIN: I don't like the shape of a long potato. We like a round, white, late potato.

The SECRETARY: Mr. Chairman, I want to remind the gentlemen that we want to get everything that is said here, so that the fellow that don't speak out for the benefit of the whole audience is likely to get things mixed up.

MR. MARTIN: Now, we grow just that one variety, Sir Walter Raleigh. We plant a seed plat each year and select the very best potatoes and soil for it, usually containing two to three acres. The seed for the seed plot is treated with formaldehyde to destroy the scab germs. The number of bushels run from 50 to 75 of ideal shaped potatoes that are carefully selected. They are planted by themselves in the potato field. There are several advantages in that. You can give better attention and spray and fertilize better. About the middle of September, ten days before the potatoes die down, we go over the seed plat and dig up all the diseased and degenerated hills that have not made the growth they should. Understand this work is done ten days or two weeks before the potatoes die down so we can see what each hill has done. The hills not making the growth they ought we dig up and discard. The dead or dying hills we dig up and take out. We take a wheel barrow, crates and potato fork and one man takes two rows and when he comes to a tuberculosis hill we dig it up and take it out. By that method we take out of the seed plot all the diseased stock. At harvest time these seed potatoes are dug and put in the cellar. During the winter when we have time we go through the seed plat product, sometimes 900 bushels, and select out potatoes of the type we have our ideals set to. First, we want the size; next, the shape. We like a potato with a good seed end and a good stem end. Here is a very good type. It is too wide for the length. Here is one I like, from three-fourths to a pound each; and these are treated with the formaldehyde, keeping the scab down. We have an automatic potato planter. I would not recommend this machine. It is too complicated.

I think one of the things brought to my attention forcibly in potato culture was the result of this planter. Here and there in the field were four successive hills of dwarfish plants not up in height with the rest of the potatoes and I wondered what was the cause. I got my thinking cap on and one day it came to me that the seed that grew those four hills came from degenerated stock. We tested it by taking seed from the poor hills and found out next year that was the cause of the poor yield. The seed plant method that I have described is one way of getting better and blooded seed. Every farmer can get good seed himself. If you have a good variety of potatoes, Irish Cobbler, Green Mountain or Sir Walter Raleigh or any other variety that you have taken good care of I would go into the field and dig out 250 or 500 hills and go to another part of the field where the potatoes made a good growth and yield and dig out say 250, 500 or 1,000 more hills and dig, lay out each individual hill separately. Don't mix them up after you get the hills dug. Go over the hills as they are dug out and select the hills that made the best yield. With these next year start a seed and breeding plat. Our potatoes are planted

on a rolled surface to insure a uniform planting depth of three to four inches, three feet apart for the drills and in the drills a seed piece every eleven inches. I don't recommend that close planting. If planted close like that on thin soil in an unfavorable season probably the whole crop would result in small marble-like potatoes.

A Member: Do you say two and one-half feet between rows is too close?

MR. MARTIN: With late potatoes that is pretty close. You tramp down and mutilate many vines with cultivator and sprayer. I would rather plant the rows farther apart and the hills closer in the rows. Then the vines don't interlock with each other and you can get through with less damage from the machines.

In cutting the potato, such a potato as that (indicating it) would be cut in four pieces, again as large as that into eight pieces. We take a common paring knife and cut the seed like that (indicating). The way we plant there are 15840 hills to the acre. I think if we allowed one pound to the hill that would give a yield of 264 bushels to the acre, and if two pounds to the hill it gives 528 bushels; but planted three feet each way gives something like 4840 hills and a pound per hill you would have 80 2-3 bushels to the acre. You can regulate the size of the potatoes or run of the potatoes quite well. Of course, you don't know what the season is going to be. That makes a difference. But if the potatoes average too large, plant larger seed pieces to the hill or hills closer; but if potatoes do not grow large enough plant farther apart in the hills and less seed, less eyes.

After the potatoes are planted we run over the field with the double row riding cultivator. We like to go over the field three times before the potatoes are up, and, gentlemen, this cultivation, these first three cultivations, are done before the potatoes are up by following the potato row ridges left by the planter. We don't try to get close to the ridges but to break up the middles. The roller has gone over the ground and in planting this row the horse walks here (indicating). On the return the other horse walks in there again. We do want to cut deep at this time of the potato's growth because no potato roots will be torn off. I would not cultivate deep after the potatoes were up 4 to 6 inches high. If you follow out the roots you will find them extending out beyond the middles and more and when we break off the roots we are interfering with the potato root system. I would not go too deep the first time over, a little deeper the second time and still deeper the third time. Just as soon as the potatoes come up so we can see the potato rows we adjust the cultivator and run just as close to the row as we can. With the double row cultivator we take every other row or the odd rows the first time over and here we have the team in here and we get astride the first and third rows and the second time over we go astride the even rows, second, fourth and sixth rows, and so on through the whole field. This makes five cultivations, three before the potatoes are up and two after. Then we put the weeder on, and we like to go straight across the potato rows with the weeder the first time. The second time over we go lengthwise. This pulls the plants straight with the row and closer attention can be given after under work. This weeder work we like to do after nine o'clock in the morning, when the atmosphere warms up and it is dry and hot. The potato plant will stand

more abuse after it is warmed up than it will when cool in the early morning. It will break off easier when cool. The rest of the cultivation is done with riding cultivator by gradually widening apart the teeth nearest the rows. The cultivation ceases the latter part of July. Ordinarily the field receives about twelve cultivations. You say that is excessive. I know it is a lot of cultivation, but at the same time while cultivating we are preparing the land for the following wheat crop. The crop gets two hand weedings, about the middle of July and middle of August.

For spraying, we use the 5-5-50 formula.

A Member: By Bordeaux mixture you mean blue stone and lime?

MR. MARTIN: Yes, blue stone, or blue vitriol, and lime.

A Member: Did you have any experience with sal soda instead of lime?

MR. MARTIN: No, I never tried it. We have found by spraying that it increased the *net profit*, not net gain but net profit. In 1910 it was \$24.00 to the acre; 1909 the net profit, after deducting the cost of labor and cost of material, etc., was \$20.08; for 1908 it was \$48.80, and 1907, \$32.42; and still we did not have very much blight.

A Member: How do you prepare your mixture?

MR. MARTIN: I make up a solution, a stock solution of blue vitriol and of lime and am careful to know I have enough lime in the Bordeaux to neutralize the vitriol. Bordeaux is rather a disagreeable solution to handle.

In spraying, we use the E. S. Brown sprayer, but there are other good sprayers. We like to bring the nozzle straight into the row and to a 45 degree angle; straight over the row and at an angle of 45 degrees down on to the row. Each application is made in reverse directions, being careful to cover the whole leaf surface.

A Member: How many sprayings do you apply?

MR. MARTIN: I could not tell you how many. We try to apply 1,200 to 1,500 gallons a season to the acre, commencing with the forepart of July and closing the first or second week of September, and we try to get so much per week. Now in an acre of land there are 43,560 square feet, but when potatoes are in full foliage there is a leaf area that would perhaps cover two or three acres, so you see you must be thorough in this work. You must apply a lot of Bordeaux in order to cover all the leaf surface, because you have a lot of surface to cover and by going in different reverse directions and swinging the nozzles right and left you can spray this vast surface though you would not cover it all if you maintained the same nozzle angle and went the same direction the whole season.

A Member: How many gallons do you use at one application?

MR. MARTIN: We have a 110 gallon machine and I think it goes over about two acres.

Here comes in a point right here. By rolling the ground we secure a uniform planting depth and that is important, especially at harvest time in a wet season. After the potatoes are planted and grown you have a problem to get them all out. In digging the crop we use

four horses. We start on the lower side, digging every other row, working up hill rather than down hill. You have got to keep the four horses up hill and if you dug from up hill down the horses up here would walk on the dug potatoes. Four rows of dug potatoes make two rows of crates. We use for drawing a truck wagon, with wheels about two feet in diameter and six inch tires, which has a platform 6 x 16 feet, its capacity being 60 to 120 bushels. We have four horses on this wagon and one man goes on each side. I have seen the wagon many times start at the farther end of the field and come through without stopping, with 90 to 110 bushels on. That is one way of handling potatoes economically. In the Fall of 1906 we dug and picked up and drew into the barn, took to West Rush, one mile away, something around 1,000 bushels loaded on the car there, totaling 1,501 bushels dug and picked in one day, and the digger broke down and stopped the pickers fully an hour. Eighteen acres yielded 7,510 bushels, an average of 417 bushels per acre. I am just trying to show you what good methods have brought about for us. We do not need new knowledge as much as we do a better application of the present knowledge to bring results. When we started the average yield of potatoes was 60 bushels per acre. The past season we had an average of 328 bushels to the acre. Our best wheat crop following potatoes averaged 45 bushels per acre.

The SECRETARY: - Mr. Chairman, I have been apt to sin many times and the mistakes of my life have been many. It comes to me more and more that I made a mistake in announcing the time for the road meeting upstairs. It is to be this afternoon, instead of to-morrow afternoon, at four thirty and short speeches are expected by the Governor of the Commonwealth, by General Beaver and by President Sparks and others. I hope there will be a large attendance at this meeting this afternoon at four thirty o'clock.

On motion duly made, seconded and agreed to, adjourned to 1.30 o'clock P. M.

Wednesday Afternoon, 1.30 P. M.

A. J. Kahler in the Chair.

The CHAIRMAN: Gentlemen, you will please come to order. The first topic this afternoon is the Report of the Apiarist, H. C. Klinger, Liverpool, Pa. Is Mr. Klinger present?

The SECRETARY. Mr. Klinger has sent his report to me and if it be the pleasure of the Board I can read the report.

The CHAIRMAN: What is the pleasure of the Board?

MR. HUTCHISON: I move the Secretary read the report to the Board.

The SECRETARY: Mr. Chairman, this report relates to the bee industry and we have a gentleman here, a Mr. William A. Selser, who is very much interested in this subject and will be able to interest

us, and if we pursue the usual course that has been pursued in the case of reports that have been sent in, this report could be received and ordered published in the Journal of our proceedings, and then we could hear this gentleman upon this subject.

MR. GLOVER: Mr. Chairman, I move the report be received and published in the journal of our proceedings.

The motion was seconded, put and agreed to.

The report of the Apiarist is as follows:

REPORT OF THE APIARIST

By H. C. KLINGER.

The year past has not been marked by any unusual features except that of the loss of colonies in wintering. The winter stores of honey in the greater part of the State were mainly honey dew. The cold of the winter being long continued, the bees were unable to take a cleansing flight, became sick with "dysentery" and died. In localities where there was no honey dew or where it was extracted in the fall and the colonies fed on sugar syrup or good honey, the winter loss was only a small per cent. Reports from all over the United States confirm the statement that bees should not be wintered on honey dew or even on a poor quality of honey. The foreign matter in this kind of honey being in excess causes a dysentery when the bees are confined too long without flight. Bees seldom "freeze to death" when sufficient stores of good honey are within reach, and the statement that "bees froze with plenty of honey" is only an evidence that they died from being confined too long on poor winter stores.

The various reports from different parts of the State indicate that the crop of honey was far below the average. This was caused to some extent by droughts and failure of the main honey plants. White clover, which is the source of the best grade of honey, was drought killed in the summer of 1909 and made but a weak stand the following spring. A few reports also were made that in several localities bees were killed by spraying with arsenical poisons. Bees died by the thousands and in one instance an entire apiary was wiped out. It seems that it takes some fruit growers a long time to learn that it is an injury, a double injury, to spray while the trees are in bloom. Certain delicate parts of the flower are injured by the spray when it comes in contact with them when it is open. Spraying at such time prevents perfect pollination and also kills the bees and other insects which Nature intended should assist in the forming of fruit. The best time to spray is before the buds open and from five to seven days after the blossom has dropped.

HONEY PLANTS

The plants upon which the honey producers of the State mostly depend are White Clover, Alsike Clover and Buckwheat. There are lumber regions of the State which yet produce crops of basswood honey, but the denudation of our forests will make that product a rarity in a very few years.

White clover carries first honors as a honey plant both in value as a source and an extra quality of honey. It yields a clear, finely flavored product and when nicely capped makes a gilt-edged article for the market. Alsike clover is coming more into prominence than formerly. Many farmers are discovering that it is profitable to sow it with the other red clovers. It is surer to "catch" than the red clover, has a tendency to "stick" to the soil longer and makes a better quality of hay than red clover alone. It produces fully as much honey as the white clover and its quality is not to be excelled. If it is grown for hay and for honey it will produce at least two good crops every season. The seeds being much smaller than those of the red clover a smaller quantity of seed is needed. A good mixture to sow for hay is one part of Alsike with three parts of red clover.

In some sections of the State buckwheat is the most important yielder of honey. The quality of buckwheat honey is perhaps not as good as that of the clovers or some of the other honeys. It is darker in color, has a heavier body and a flavor peculiar to itself. It is liked by some consumers and to others it is not so palatable. It usually does not command as high a price in the markets and yet there are some places where it brings as much as the finer grades of honey. Buckwheat does not require a large application of fertilizer nor even a rich soil to be a good producer of grain. It frequently yields forty to fifty bushels per acre and instances are on record of much larger yields. It is a quick crop and always leaves the soil in a mellow condition. Many of the hillsides, too poor for other crops, might be sown profitably to this grain merely as a grain crop. It seldom fails as a honey producer and not infrequently gives immense flows of honey. What farmer raising only a few acres of it would not keep a colony of bees "get and hold" all of his own?

There are numerous other plants which in some parts of the State are abundant enough to produce crops of honey, but in most localities serve only to tide over the supply from one flow to the other. Among these is alfalfa, another clover, which yields enormously in the West, where in many places it is the chief source of honey. This plant, too, will prove valuable to the beekeeper of the East after we have passed the experimental stage of growing it.

Another plant pressing itself into notice is Sweet Clover. This plant was for some time condemned as a weed, and working its way through years of prejudice, has attracted the attention of agriculturists and beekeepers as well. In growth it is similar to Alfalfa, and while it is young closely resembles it in appearance. It blossoms during a long season, producing a finely flavored grade of honey. It is valuable as a forage plant and as a soil enricher and inoculator it has no superior. A report from Lancaster county states that it was sown on a field infested with Canadian thistles in 1906, and allowed to reseed itself until in the summer of 1910 it was an almost impenetrable mass of leguminous matter five to seven feet

high. The Canadian thistles were crowded out. It will grow on waste places, the hardest clay, stony dirt banks and the most barren looking soil. Why not sow some of this seed on waste places, crowd out obnoxious weeds, enrich the soil and make the air hum with bees?

BEES AS POLLENATORS

In the economy of Nature the bee does not only serve as a collector of nectar but performs another most important work. In order that fruit may be formed, fertilization of blossoms must take place. This work is done either by insects or the wind. Some blossoms are staminate while others are pistillate. In order that fruit may be produced the pollen must be carried from the one to the other. Other plants have both pistils and stamens on the same flower. It may seem unnecessary that in this case any cross pollination should take place. Nature has, however, provided that in order that species may not degenerate, in many cases, the pollen of any given flower does not fertilize the pistil of the same flower. This is due to the fact that pistil and stamen do not coincide in their time of ripening and thus depend on the pollen being brought from other blossoms. The bee is the best pollinator known, ever ready to perform his work for what he gathers by the way. He is the best answer to the fruit grower's problems as to what varieties or how he shall plant in order that perfect pollination may take place.

DISEASES OF BEES

The great importance of this subject will perhaps suffice as an apology or a partial repetition of a former report. Of the reports received during the year, three diseases are mentioned as prevalent: Dysentery, American Foul Brood and European Foul Brood. The first named was previously discussed. It is not infectious and can largely be prevented by the wide-awake beekeeper. The last two mentioned diseases are infectious and destroy colonies by attacking and killing the brood. These diseases are so widespread that they are the cause of alarm. Whole apiaries have been destroyed before the cause was known. It is impossible to keep it out of an apiary when others nearby have apiaries that are diseased. A single drop of honey robbed and carried from a diseased colony will infect a whole apiary. From recent reports to the Division of Apiculture, Washington, D. C., 18 counties in the State have reported cases of American Foul Brood and 29 counties European Foul Brood. Reports from all the counties were not available so that other counties not heard from may also have cases of the disease.

The progressive beekeeper will control and stamp out the disease, but it may be impossible to get all the beekeepers who have infected colonies to treat them promptly and hence it is desirable and necessary that the State pass laws that will provide for inspection of apiaries and give power to Inspectors to compel careless beekeepers to treat diseased colonies. It is the only remedy that is efficient in stamping out the diseases. In a large number of states laws have been passed and the results have been satisfactory.

With proper control of bee diseases and with the proper study and manipulation, this State has large possibilities and opportunities for the beekeeper. While but few localities will support possibly more than seventy-five to one hundred colonies, one can travel for miles without finding a single colony of bees. There are thousands of blossoms everywhere unvisited, and safe to say, tons of honey wasted.

It would be as unwise to advise every one to become beekeepers as it would to follow any other one occupation. There are those who specialize in apiary work and not only make a living but lay up a snug sum besides. To do this requires a certain adaptability, a knowledge of the business, and constant study. However, it is not necessary to specialize in order to succeed. Many farmers could keep a few bees and have their table supplied with honey every day in the year. The two interests are allied. Frequently the farmer is a fruit grower to a greater or less extent and the bees by their daily visits increase his yield of fruit. On the other hand, he could greatly increase his yield of honey by sowing his waste land to honey bearing plants. Any one within reach of a few acres of honey bearing plants by an investment of a few dollars in a colony of bees can not only make a handsome profit on his investment, but may find an increasing interest and sometimes to the extent that for the time being he will forget all his other troubles.

PROF. SURFACE: Mr. Chairman, I would like to say a few words by way of introduction of Mr. Selser; that he is one of the officers of the State Bee-Keepers' Association; that he has been one of the most successful beekeepers in the State and is very widely known in the bee industry. He has a message of importance to present here to-day.

I move you, Mr. Chairman, that Mr. Selser be asked to occupy the time that would have been taken by the reading of this report.

The motion was seconded, put and agreed to.

ADDRESS OF MR. SELSER

Mr. Chairman and Members of the State Board of Agriculture: It gives me great pleasure this afternoon in a few moments to tell you something that I could probably occupy two or three hours and might interest you all through. It seems to me hardly necessary for me to say anything that might interest the Board of Agriculture more deeply in connection with the work of bee culture because you show that interest by having a specialist of our number on your Board and his report that was spoken of. I hardly know where to begin on this vast subject, but I must confine myself to a few moments.

The SECRETARY: You are to take the time that would have been taken by this report.

MR. SELSER: If I were riding through this State and looking across the fields of the various counties and in the various agriculture pursuits and was to find as I rode some crop that was going to waste after it had been produced by Nature, and was to inquire into the

reasons and whys and wherefores of this crop where it would be going to waste, and I was to receive an answer that there were not enough workmen to gather the harvest, I think if I should report that back to the Board, you would rise up in horror or in consternation to find such a state of things existing in our own borders. Well, I am going to tell you something just as startling as that when I say that all over this State, county after county, I think I am safe in saying there are millions of dollars worth of harvest going to waste because there are no workmen to gather it; and when I speak of that I mean the marvelous workmen, the little honey bee; and in speaking of the harvest, is meant the money product of the plants and flowers throughout the State. There is no question about it, gentlemen, but what there are millions of dollars worth going to waste in this State because there are no bees to gather the harvest. I can prove this statement very readily if I want, but shall not talk on that line, simply make a statement of the facts that exist.

But what I want to get you interested in this afternoon more than anything else is to stop the waste of what we have already been gathering in the past years. Unless we do something and do it right away there is going to be a ceasing of the immense harvest we have gathered throughout the State of honey in the past years. In the twenty-five to thirty thousand beekeepers in this State, representing a harvest of honey up in many thousands of dollars—I am not familiar with the exact statistics—there has lately come a menace into the industry in the form of a disease among our bees, not so much among the bees but among the babies, the little bits of pupua of the bees or brood. This disease is called “foul brood,” and just to give a little instance of what it has done, let me say that ten years ago, in the lower end of Montgomery county, I kept four hundred and fifty colonies of bees. I noticed one year that I had a peculiar condition arise in the hive and after investigation I found it had a peculiar smell and I knew it must be some disease at that time, but did not know what it was. I immediately destroyed the hive and done it in such a way that I only spread the disease. I burned the hive, and the result of this was that the honey ran all around and the disease was thus spread all over the apiary by the honey that leaked out of the burned hive, and so for year after year I lost hive after hive, because I did not know the nature of the disease, until at the present time at that location four hundred and fifty colonies are reduced to one or two. When I say that, I am giving you the experience of many through this State. The trouble largely was that a beekeeper within a mile and a half of my farm kept bees in old box hives and he was as ignorant of the disease as I was, but after I learned something about it he could not manage his box hives because not accessible. I found the same condition existing in other counties in the State, and while I could eradicate the disease by scientific methods my neighbors were still spreading that disease in our bees. So you see how necessary it is for us to control the whole situation and the whole flying distance of bees.

I would just like to read you a little statement of the United States Department of Agriculture before I close, in regard to this great subject. This came in sort of a public statement from the United States Department of Agriculture about six weeks ago. It reads as follows:

"U. S. Department of Agriculture,
Division of Publications.
Jos. A. Arnold, Editor in Chief.

"WORK OF THE DEPARTMENT OF AGRICULTURE ON BEE DISEASES

"The honey bee annually produces a crop of honey valued at (at least) \$20,000,000, and there are vast opportunities for increasing this output. The most serious handicap to bee-keeping in the United States is the fact that there are contagious diseases which attack the brood of the honey bee. There are now recognized two such diseases, known as American foul brood and European foul brood. From data recently obtained by the United States Department of Agriculture, it is known that American foul brood exists in 282 counties in 37 States, and European foul brood in 160 counties in 24 States, and it is estimated conservatively that these diseases are causing a loss to the bee-keepers of the United States of at least \$1,000,000 annually. This estimate is based on the probable value of the colonies which die, and the approximate loss of crop due to the weakened condition of diseased colonies. The States in which the diseases are most prevalent are California, Colorado, Illinois, Indiana, Iowa, Kansas, Michigan, Missouri, Nebraska, New Jersey, New York, Ohio, Pennsylvania, Texas and Wisconsin; and it is unfortunate that these are the States in which honey production is most profitable, making the future outlook of the bee-keeping industry so much the worse unless active measures are taken to control the diseases. Furthermore, the distribution of these diseases is by no means fully known, and they are constantly spreading.

"Both of these diseases can be controlled with comparative ease by the progressive bee-keeper; but the chief difficulty encountered in combating these diseases is the fact that the majority of bee-keepers are unaware that any such diseases exist; they therefore often attribute their losses to other sources, and nothing is done to prevent the spread of the infection. It is, therefore, necessary in most cases to point out the existence and nature of the diseases, as well as to spread information concerning the best methods of treatment. Several States have passed laws providing for the inspection of apiaries for disease, and the bee-keepers in other States are asking for the same protection, so that careless or ignorant bee-keepers can be prevented from endangering their neighbor's bees. This inspection is a benefit in the spread of information concerning disease, in so far as the inspectors can cover the territory. The Department of Agriculture is helping in this work."

And so what we ask of you to-day is for you to endorse a bill that the Pennsylvania State Bee-Keepers Association drafted at their last annual convention, at which the whole ground was gone over very carefully. At our annual convention we took the various laws of the different states, of probably some ten states in the United States now that have just the law we are asking for, and cut out what we thought were some of the objectionable features and put in the best thoughts and are now ready to present what we think is a perfect bill to the Legislature. Our idea is to have it worked under your supervision so that there will be no new machinery set in motion and no extra expense on the State any further than absolutely necessary; so that largely under your own expenses you can supervise this work. The bill now is in such shape that it delegates this work to the State Entomologist and there are ten inspectors already inspecting the diseases of the orchards and other diseases known to the agriculturists and horticulturists, and carry out along that line the work. So that our bill is simply an act or a supplement or amendment to your act passed by the General Assembly and called General Assembly Act No. 60.

My suggestion is, in conclusion, to ask that your committee of this Board on legislation endorse this bill and do what they can to see to its passage.

MR. HUTCHISON: Mr. Chairman, I move the bill be referred to the Committee on Legislation for their consideration.

MR. GLOVER: Mr. Chairman, I second the motion.

The motion was put and agreed to.

MR. STOUT: Mr. Chairman, if permitted, I want to say a word in connection with this subject.

I am somewhat interested in this question as a bee-keeper and I have studied this subject from all phases. I get various bee journals and I see it is discussed and rediscussed from all parts of the United States, and while I am in sympathy with the movement, I have yet to be convinced that there is such a thing practical as getting inspectors to do this work that is proposed to be accomplished by this movement. Now, I know there are some laws on our statute books already that are practically dead letters. Some years ago our Legislature enacted a law authorizing our supervisors in the townships to go and destroy peach trees affected with "yellows." This is a disease that no one but an expert can detect at first, and I defy most any of the ordinary supervisors of the township to point out which of the trees are affected with peach yellows. They can't do it. And this law, while I would favor it if there was any possibility of carrying it into effect, would entail a great deal of expense. Now if you had one inspector in the State it would take him one hundred years to go over it to inspect the apiaries; if ten or fifty it would take them a long time to accomplish the same. And then it is a question, unless a man is a scientist and been a man who has had bees for a long period of time, whether the inspector would be able to discover this. I know very well in my own apiary I can go over my hives. I can open them and examine carefully and inspect my comb there; but with box hives how can he detect the foul brood in there. I am in sympathy with the movement, but yet at the same time I cannot see how the thing can be practically accomplished that is aimed at.

MR. SELSER: I would like to discuss this but I know we don't have the time, but I will say to the Committee on Legislation that we will get it done practically and on all these various points they will have no doubt about its workings with our explanation of it.

PROF. SURFACE: In addition to that may I say that in about twenty-five other states in the Union they have this inspection work of apiaries in successful progress. In Canada they have several inspectors. The disease there was so bad that it almost wiped out the industry entirely and it spread over in the direction of New York. In Wisconsin they have one inspector and he has the disease now down to one or two counties and gradually working it out. The inspection work is practical because done in other states, and where it is successful in other states we think it can be successfully done in ours.

MR. HUTCHISON: I would like to ask this gentleman a question. He stated that he kept four hundred and fifty hives or colonies of bees at one place. Can that be profitably done? Is there enough of material for them to work on in that section or have you plants, or what did you do?

MR. SELSER: I reply to that by saying that bees gather during the month of May and June, which are the harvest months, their crop to do them for the whole twelve months in the eastern section,

the section I am located. If, however, we take from them the crop that they gathered in May and June and sell it we have to, when we have such a long period between, feed back sugar syrup to them through the months of August and September to have them go through the winter. Where a man is running for business he can sell the honey for eighteen to twenty cents a pound and buy sugar at five and one-half cents a pound to feed back to the bees. It pays to do it.

The CHAIRMAN: Any other remarks in regard to this?

The SECRETARY: Before we take up another number I want to make a statement. That is, a number of persons throughout the State have written to me urging the passage by the General Assembly of an act prohibiting the scattering broadcast over the Commonwealth the seeds of foul weeds and asking that there be an act passed extending the provisions of the act that has been passed some years ago in reference to the Canada thistle to other weeds.

Now, I don't know any better thing for me to do in regard to this matter than place it before this Board and see what you think about it, and I have just now drawn this resolution:

"That the Committee on Legislation be instructed to present to the General Assembly now in session and urge the passage of a bill extending the law to prevent the spread of Canada thistle to the following foul weeds:"

And if in the judgment of the members of this Board this is a good bill to present to the Legislature, I would like to have you suggest what those weeds shall be. You know what is most troublesome in your sections of the State; you know what the provisions of the Canada thistle law are. The owner of the land is responsible for the care of the land on which the thistle grows and is required to see they are cut regularly so that they shall not be permitted to go to seed, and if there is danger of their going to seed anyone can make complaint to the constable of the township and he gives notice to the owner of the property, and if he fails to cut the thistles he can employ men to go upon the premises and cut them and collect the charges from the owner of the land.

Now, the question is whether this Board, in its judgment, thinks it would be proper to extend the provisions of this act to other foul weeds. I know in some sections of the State we are pretty nearly overrun and there is a general complaint in regard to this matter. I have a number of letters from different parts of the State in regard to it. I may say a bill has been prepared that I think provides for prohibiting the sale of grass seed, clover and alfalfa seeds in which there is to be found more than five per cent. of certain foul weed seeds.

MR. GEARHART: I am as much interested in the destruction of foul weeds, and especially of the Canada thistle, as any other member of this Board, and as the Secretary has said we have had for years on the statute books a very strenuous law for the destruction of the Canada thistle and I have never seen any one case—perhaps there may be sections of the State where it was employed—but I have never seen in our section of the State one single case where the law has been carried out, and it seems to me that our statute books

are having incorporated entirely too many cumbersome laws that are ineffective, and unless some provisions are made for the enforcement of this proposed law I cannot see where there is much use in adding it to our statute books. Now, if some organization is formed or responsibility placed upon somebody who is not an individual, who is not a neighbor of mine. I don't like to prosecute the neighbors because that engenders bad feeling and we don't want to quarrel with our neighbors. They are farming all around me and I spend dollars every year to rid my farm of Canada thistle and other weeds, wild carrot and goldenrod and things of that kind; and yet there is a farm just west of me that has been for years polluted with wild carrot and other weeds and the seed gets on me by the bushel and I have to destroy them. But I don't want to prosecute my neighbor, and how are you going to enforce the law after you have got it?

MR. SHOENER: In our section in the cases where we farm our own farms we try to keep down the weeds, but there are a number of tenant farmers in our neighborhood and they don't try to keep down the weeds and one of the worst weeds we have is the wild carrot and daisy and I think they should be included. I think it is an important matter for my part. I don't know that the law is to blame if we don't enforce it; and if we don't, I think we ought to enforce and not allow it. The bill may be framed making it the duty of the constable to enforce it.

MR. DURNALL: I would like to ask, Mr. Chairman, whether or not the same bill includes some other noxious weeds. Isn't there anything other than the Canada thistle embraced in that law?

The SECRETARY: I think not.

MR. DURNALL: Then I have been under a wrong impression. I know that the trouble has been where they have been under the impression that that did exist under the law, providing for other noxious weeds than the Canada thistle because I thought it was. The neighbors would not keep them down and they would refuse the same as my friends urge here. It is a question of neighborly conduct toward their fellowmen; not to enforce it against the will. If you could not do it from moral suasion or very shame as to the condition of the farm, they would not do it at all; and we have acres upon acres in Delaware county that are going to waste under the burden of noxious weeds and we cannot get the law enforced.

MR. STOUT: In traveling over Lehigh county the past year I found a section that is very badly affected with Russian thistle, the only place I discovered it in Pennsylvania. That seems to be one of the most damnable weeds we have at the present time. I saw fields and the trolley tracks run over with it. I asked the man who owned the fields if he had taken time to try to destroy them. He said he had for a number of years been trying and the more labor he spent on that the more it increased. I just wanted to know whether this pest prevails in other places in Pennsylvania.

MR. DURNALL: Permit me to say that in the last few years we have been annoyed very much with this new thistle. We did not know until a year or two ago what it was. I am convinced that we have to look after it. The gentleman says he did not see how they

could do anything with it. Last year in a field of my own I did not know there was anything of that kind. I did not know we had it until we cut the corn and we found it was all over the ground. I did not know what to do; so we cut it and as soon as the leaves were dry I set fire to it before the seeds germinated.

Now, in regard to this Canada thistle, we have been compelled to have it enforced at our place and I don't know of one that was notified that if he did not destroy it and not allow it to go to seed that he would be dealt with according to law, and they cut it down. It is a good thing to be good to the neighbors, but when the neighbors are not good to you you must do the next best thing.

PROF. SURFACE: I want to call your attention to the fact that entire farms have been abandoned because of the horse nettle. This is an absolute fact and can be proven again and again. In the western part of our State we have today entire fields infested with the paint brush. It absolutely becomes so dense that it will not touch the ground and no stock will grow there. If legislation should be the proper means of suppressing this I think it would be worth all its costs to our farmers. I think the farmer could well be protected by the law the same as he is in the commercial fertilizers which are passed to the Secretary of Agriculture under the present law. The informant sends the data to the Secretary of Agriculture who sends an inspector there and see that these premises are inspected and then they must be treated according to law. The informant is not brought in and then it is not making enemies among the neighbors. If the law provided that the constable attended to this when made aware of the facts, possibly something of that kind might help.

A Member: Mr. Chairman, it may seem harsh, but I want to state at this point that I believe the growing of weeds is a natural condition and that the soil's condition is largely responsible for it, and that the plants that grow on that soil simply means Nature's effort to correct a condition that exists in that soil.

The SECRETARY: But, Mr. Chairman, you must remember that while the "good man slept the enemy came and sowed tares." There are some of these weeds that Nature did not provide for. I know, as a general proposition, what the gentleman states is correct. I know that there are certain weeds that are a great blessing to humanity, a blessing to the farmers, not only for the reason that it causes them to cultivate their gardens, which they otherwise would not do, but it provided vegetable matter to take care of the soil and hold it up. But the Canada thistle is something else. It is a weed the enemy came and sowed the seed while the good man slept. So we must not charge these bad things to Nature.

PROF. MENGES: I am not a member of the Board, but I believe that the Secretary of Agriculture, the Department of Agriculture and the State College are doing a work that will do more for the eradication of weeds than all your legislation and all your laws will ever do, and that is better farming. When you get down to better farming, teach your farmers to farm not for weeds but for crops. That is the thing to do. There is no trouble on farms that are cultivated right and I know this is a pretty hard thing and it may hit a lot of us and hit hard, too. I know farmers that grow their crops

don't grow weeds. They don't grow, and that man don't need any legislation. Now, then the thing to do is to try to get these fellows up to a higher realm.

About the Russian thistle, I met a young man last week in my institute work and he said the Russian thistle is a blessing to the northern part of Pennsylvania because the soil is deprived of all vegetation and the weed that has taken hold there furnished this in a manner and prevents it from starving. I do not know how you like that. We ought to go a little slow about this matter. This gentleman here, it seems to me, is on the right track. We should talk about these weeds being put here by Nature to help us to keep things in condition. I know the Canada thistle is cursed wherever it has been, except where they don't grow. Go into New York not far above the Pennsylvania State line and what do you find. You find the Canada thistle there and they don't care that (snap of fingers) for it. Why? Because it is within the latitude where it does not thrive very well. Go South and go beyond Virginia and you don't find it there. It seems that Pennsylvania is the place where it does thrive, and probably we ought to have some legislation in regard to that and then let us enforce it. I don't know whether it is the right thing to put laws on the statute books, especially such as will interfere with our relations among ourselves, our farmers, and get us into more trouble. I say that it don't look to me altogether right. I believe better farming is the answer to that question.

MR. WEIDNER: I think another thing that ought to be included in that list is barren grass. We have barren grass in Adams county and some of the people pay no attention to it and let it go to seed and bed in. I know farmers near Gettysburg that spent two to three hundred dollars to destroy this barren grass and yet it appears every year.

The SECRETARY: We might prolong this discussion indefinitely. If it be the sense of the Board that a resolution of this kind be referred to the Legislative Committee let every one consult with that committee.

The CHAIRMAN: What is the pleasure of the Board in regard to this resolution?

MR. HUTCHISON: Mr. Chairman, I move the resolution be referred to the Legislative Committee.

A Member: I second the motion.

The SECRETARY: Without naming any of the weeds that are to be suppressed?

The CHAIRMAN: I suggest that you place in there some of the weeds that have been discussed here and take chances; have them all put in, the wild carrot and on down, and then let the committee consider them and have the members bring to the attention of the committee whatever weeds have been prevalent in their sections.

The SECRETARY: How about the wild mustard brought in from the West?

MR. HUTCHISON: That is right; we have the wild mustard and dodder; and I think horse nettle is one of our worst weeds.

The SECRETARY: In the letters I have received, the weeds named include Russian thistle, wild carrot, wild mustard, horse nettle and the wild onion or garlic, and as to that latter the greatest complaint seems to be from the southwestern part of the State.

A Member: Anything about the paint brush?

The SECRETARY: O, yes; the paint brush from the northwest.

A Member: I suggest the ox eye daisy.

MR. BARNES: Last summer I saw where one neighbor had mowed off the thistles along the side of the road, in from the middle, and the next neighbor let them all grow; and that is the misfortune of this: Where there is nobody to take care of it it is nobody's business and they spread.

The CHAIRMAN: We will have to pass this question. It has been referred to the Legislative Committee.

The next number on the program is the Report of the Mineralogist, Baird Halberstadt, who will proceed.

A Member: Mr. Chairman, I rise to a point of order. The gentleman's motion was neither seconded nor put and therefore the resolution has not yet been referred to the committee.

A Member: It was seconded by me.

The motion to refer the resolution to the Legislative Committee was then put and agreed to.

The CHAIRMAN: We will now have the Report of the Mineralogist, Baird Halberstadt, of Pottsville, Pa.

Mr. Halberstadt then read his report as follows:

REPORT OF MINERALOGIST

By BAIRD HALBERSTADT, *Pottsville, Pa.*

While twenty-nine (29) states of the Union are producing coal on a commercial scale and the production of all kinds of coal in the United States exceeds that of any other nation in the world, it should be particularly gratifying to the citizens of Pennsylvania to know that our own Commonwealth not only mines and ships more coal by far than any other state, but that it possesses a larger quantity of high grade coal than any other state. Other states may have greater areas underlaid by Coal Measures, but not one can compare with Pennsylvania when the grade and value of its coal deposits are considered.

The State is made up of sixty-seven (67) counties, and of this number, forty-three (43) are either in whole or in part underlaid by the Coal Measure rocks. Of the forty-three (43) counties so endowed, thirty-two (32) contain coal of the Bituminous and Semi-

Bituminous variety, the other eleven (11) produce, with the single exception of Lebanon, high grade Anthracite and Semi-Anthracite coals. Beaver and Butler counties, in addition to true bituminous coals, produce a good grade of Cannel coal. The latest statistics available show, that in 1909 the production of coal in Pennsylvania reached the enormous total of 216,429,528 net tons; that its tonnage exceeded that of any nation in the world save Great Britain. In the production of this enormous tonnage, there were employed 357,116 persons.

The ten (10) counties from which the production of Anthracite coal was mined were Carbon, Columbia, Dauphin, Lackawanna, Luzerne, Northumberland, Schuylkill, Sullivan, Susquehanna and Wayne.

The counties producing the Bituminous tonnage were Allegheny, Armstrong, Beaver, Bedford, Blair, Bradford, Butler, Cambria, Cameron, Centre, Clarion, Clearfield, Clinton, Elk, Fayette, Greene, Huntingdon, Indiana, Jefferson, Lawrence, Lycoming, McKean, Mercer, Somerset, Tioga, Washington and Westmoreland. Although Lebanon county in the Anthracite district and Crawford, Forest, Potter, Venango and Warren in the Bituminous district are in part underlaid by Coal Measures, no coal is mined from these on a commercial scale, although it is quite likely, that for local and home consumption, coal was mined in all of these counties.

In 1890, when in charge of the collection of the coal statistics of Pennsylvania for the Eleventh Census of the United States, I made an exhaustive examination into the annual coal tonnage mined from very small operations, for local and home consumption and which was never before accounted for. To the surprise of everyone, this was found to exceed one million tons.

The spot value of the coal product in Pennsylvania in 1908, when 200,448,281 short tons were marketed, was \$276,995,152. A comparatively recent computation by Mr. M. R. Campbell of the U. S. Geological Survey (1908) leads him to believe that the original tonnage in the Anthracite coal fields of Pennsylvania was 21,000,000,000 short tons and that of the Bituminous fields 112,574,000,000 short tons. Deducting the coal already mined and that left for support in the mines, Mr. Campbell estimates that at the close of 1908, there remained in the ground nearly 17,000,000,000 short tons of anthracite of which, approximately, one-half could be won.

In the bituminous region, he estimates, after the deduction of tonnages already mined and coal left in the mines for support, the tonnage remaining at the close of 1908 to be 109,000,000,000 net tons.

With an annual tonnage production of both anthracite and bituminous coal equal to that of the year 1908, Mr. Campbell estimates that the Anthracite coal fields of Pennsylvania will be practically exhausted in one hundred (100) years, and the Bituminous fields in six hundred (600) years.

As advances have been and are made toward better and less wasteful methods in many other directions, it is entirely within the bounds of probability to say that methods will be invented sooner or later whereby greater efficiency can be obtained from coal, than through the wasteful, yes, almost criminal, methods now practiced in its utilization. Many plans are now being perfected to check preventable losses. The gas producer is destined to play an important part

in checking waste, and it is not wild to predict, that even with present appliances, coal can be distilled and the gas derived from it piped, as is done with natural gas, and compete with this natural product.

How is the installation of plants at mines for producing electricity and conveying its energy to desired points, to be overlooked, when the matter is given serious consideration. Plans, too, to convert the heat units of coal into electrical units of work, without the intervention of the wasteful steam engine, are at present being considered.

Notwithstanding the vast deposits of coal within our State and the daily use of this almost indispensable fuel, it is surprising that even many of those who are mining and shipping it, as well as the mere users of it, should know so little about it and the products which can be derived from it. Generally, it might be said, that to the man or woman of average intelligence, coal is merely a black substance dug from the earth and is burned in stoves to furnish heat for cooking food, for personal comfort and to generate steam in boilers or perhaps some will say, in addition, that from it gas and coke can be made.

It would be hard to conceive of a more beautiful story than that of coal, from its origin; the successive stages of development through which vegetation passes in its progress from the growing plant to anthracite, but when we read that from this black, greasy, smutty mass can be derived medicines, fertilizers, perfumes and exquisite coloring matter, the story becomes almost romantic. Interesting and instructive as is the story of coal, the limited time at my disposal will not permit me, much as I would like to do, to give it in detail.

Briefly, the successive stages through which the vegetation passed in the formation of anthracite coals are:

| | |
|----------------------|---------|
| Peat | |
| Lignite | { Brown |
| | { Black |
| Bituminous Coal | |
| Semi-Bituminous Coal | |
| Semi-Anthracite Coal | |
| Anthracite Coal | |

No considerable, if any, commercial deposits of Peat or Lignite are found in Pennsylvania, but no more valuable deposits of Anthracite and Bituminous coals are, perhaps, to be found anywhere, than in our own Commonwealth. The anthracites are used largely for household and industrial purposes. The semi-anthracites furnish an almost ideal domestic fuel, and as such, notwithstanding their extra cost, are in brisk demand throughout the year. Formerly, anthracite coal was extensively used in smelting iron, both in furnaces and cupolas, but of late years coke, because of its superiority has practically supplanted raw coal, in this direction. A new use for anthracite has been found in recent years for the production in connection with crude petroleum, of illuminating gas, and through the use of gas producers, it will sooner or later be extensively used for the production of gas for heating, metallurgical and other purposes. Bituminous coals vary much more in analyses than do the anthracites, for while the component parts are practically the same, their proportions differ widely.

In selecting a coal for specific uses, care must be exercised, because for certain purposes, a more expensive coal would not give as good results as a lower priced product. Certain coals are far better adapted to one purpose than another.

For smithing purposes, a semi-bituminous coal is far superior to a true bituminous coal, for by the use of the latter, because of its high volatile matter percentage, instead of a steady hot fire, the smith has a flaming one, from which much of the heat which should be concentrated escapes into the shop or passes out through the chimney. At several collieries in Clearfield county, mining the Lower Freeport coal bed, an ideal blacksmith's coal can be obtained. For the smithery and steam generation, the semi-bituminous coals are preferable to the bituminous or high volatile coals. Valuable as are the semi-bituminous coals for the smithery and for generating steam, for the manufacture of illuminating gas, they are not adapted and should not be used for this purpose.

In the matter of gas coals, Pennsylvania again shows her superiority, for the coal of the Pittsburgh bed in parts of Westmoreland and Allegheny counties has no superior, if an equal, in the United States for the manufacture of illuminating gas. The coal produced from the Pittsburgh bed in the Connellsville region makes the standard coke of the United States and, as a coal approaches or recedes from the analysis of this coal, its value as a coking coal is seemingly determined, at least by the trade.

It is interesting to study the changes shown in the analyses of coal from the Pittsburgh coal bed, as they show much difference in the percentages of constituents and especially so in the amount of volatile matter and sulphur contained. Connellsville coal (Pittsburgh bed) valuable as it is as a coking coal can not compete with the Youghiogheny-Westmoreland coal for gas purposes, nor could the latter compete with the former for the manufacture of coke. A good grade of gas coal has been mined at Reynoldsville in Jefferson county, and a good coke is made in the vicinity of Punxsutawney, in the same county.

Cokes are manufactured from the coals of the Upper Freeport and Upper Kittanning beds along the main line of the Pennsylvania railroad, between Cresson and Johnstown, as well as a small amount in Huntingdon and Bedford counties. The main source of supply of coke in Pennsylvania is drawn from the Connellsville region, in fact, it may be said that none of this coal is shipped in a raw state but the entire output is manufactured into coke. The Youghiogheny-Westmoreland coal output is largely devoted to the manufacture of gas. This is as it should be, because these coals possess to a very high degree the essential properties requisite for the manufacture of coke and gas.

Coals from certain districts in Pennsylvania have long enjoyed and retain enviable reputations for excellence for specific uses. In fact, so strongly have they become intrenched, that they are now accepted as standards, and when coals from other districts are brought into the markets, these coals are used for comparison. In these days of brisk competition, no district can long maintain its lead, unless its coals possess the essentials requisite.

The question arises: What are the essential characteristics to be sought when purchasing coal for specific purposes.

The specific purposes, it is assumed are:

- (1) Steam generation.
- (2) Gas manufacture.
- (3) Coke manufacture.
- (4) Smithing purposes.
- (5) Domestic uses.

Steam Coal

For the generation of steam, a coal should possess

- (1) A high evaporative power.
- (2) It should kindle readily.
- (3) It should burn steadily and generate a large body of steam quickly.
- (4) It should not clinker, even when subjected to a high heat.
- (5) It should be low in ash.
- (6) Its percentage of sulphur should not exceed in any case, one per cent., as this is detrimental to both grates and flues.
- (7) The contained volatile matter should not exceed the amount requisite for rapid combustion.
- (8) It should bear transportation well, so that it will not be seriously reduced to fine coal.

A study of the chemical analyses of Standard steam coal seems to indicate that the best results have been obtained wherein the percentages ranged as follows:

| | |
|------------------------------------|----------------------|
| Fixed carbon, | 67 to 74 per cent. |
| Volatile combustible matter, | 17 to 22 per cent. |
| Sulphur, | 0.5 to 0.9 per cent. |
| Ash, | 5.0 to 8.0 per cent. |

Gas Coal

The requisites of a good coal for the manufacture of illuminating gas are:

- (1) That the percentage of volatile matter should exceed 33 per cent.
- (2) That the percentage of sulphur should be low and never exceed 0.8 per cent.
- (3) A low percentage of ash, not more than 6 per cent.
- (4) That it should yield from 75 to 85 candle feet per pound carbonized.
- (5) That it should leave, after the extraction of the volatile matter, a bright merchantable coke.
- (6) It should be able to bear transportation to great distances, without being reduced to slack.

An average of six (6) analyses of coals from the Youghiogheny-Westmoreland gas coal district shows:

| | |
|------------------------|---------|
| Moisture, | 1.475 |
| Volatile matter, | 37.404 |
| Fixed carbon, | 56.024 |
| Sulphur, | 0.687 |
| Ash, | 4.410 |
| <hr/> | |
| Total, | 100.000 |

Coking Coal

The essentials of a good coking coal are:

- (1) It should be pure bituminous coal.
- (2) That it should contain a sufficient amount of volatile combustible matter (25 to 30 per cent.) to complete the coking process, with the expenditure of but little, if any, of its fixed carbon.
- (3) It should not contain over 0.7 per cent. sulphur.
- (4) That its phosphorus content should not exceed 0.12 per cent.
- (5) "That the coke produced from the coal should possess sufficient tenacity to sustain, without crumbling, the burden and blast of the furnace, and the cellular structure should be sufficiently open to facilitate its impregnation and solution by the carbonic acid gas in the furnace."

A typical specimen of Connellsville coking coal, upon analysis, showed:

| | |
|------------------------|---------|
| Moisture, | 1.260 |
| Volatile matter, | 30.107 |
| Fixed carbon, | 59.616 |
| Sulphur, | .784 |
| Ash, | 8.233 |
| <hr/> | |
| Total, | 100.000 |

A very good grade of coke is made from the coals of the Pottsville series, in both the New River and Pocahontas regions of West Virginia. Analyses of these coals exhibit a higher percentage of fixed carbon and lower percentages of moisture, volatile combustible matter, sulphur and ash than the Connellsville coal. The deficiency in volatile matter in these is detrimental, for the loss of carbon in coking exceeds that of Connellsville by 12 per cent.

Smithing Coal

The requirements for a good smithing coal are that:

- (1) It should possess a high heating power and to obtain this, the percentage of fixed carbon should exceed 70 per cent.

- (2) It should contain at least 18 per cent. and not more than 22 per cent. volatile matter which is quite sufficient to make it kindle readily and to supply the heat required for coking; it should also possess sufficient coking qualities to form an arch or vault over the forge.
- (3) It should not exceed 0.7 per cent. sulphur, since an excess of sulphur prevents good welding.
- (4) The percentage of ash should not exceed 6 per cent.
- (5) The coke should be bright, clean silvery and have a metallic ring when struck.

With a coal possessing these properties, there is but little waste and, with such, a smith can concentrate the heat upon the iron to be wrought and not have a great blazing fire, with most of the heat escaping through the flue or chimney. When the sulphur exceeds one per cent. a scum or greasy substance forms on the surface of the iron, making a strong weld impossible, and it is otherwise detrimental.

A coal that, among others, was recently tested for blacksmith's use and which gave by far the greatest satisfaction showed upon analysis:

| | |
|------------------------|---------|
| Moisture, | 0.780 |
| Volatile matter, | 21.680 |
| Fixed carbon, | 73.052 |
| Sulphur, | 0.688 |
| Ash, | 3.800 |
| <hr/> | |
| Total, | 100.000 |

Coal for Domestic Use

For domestic purposes, a coal is desired that burns steadily and will remain ignited at a low temperature until consumed. Such conditions can not be obtained from a true bituminous coal, because it burns too freely and is difficult to control. Again, the high volatile coals, if burned in open grates or stoves, not only throws out soot and dirt but clog the chimneys. Such coals, if high in sulphur, are extremely objectionable, not only on account of the odor thrown off, but because of their tendency to corrode grates and pipes. A coal forming clinkers at a low temperature is undesirable, since such will check the draft by clinging to the grate bars. A coking coal is also undesirable. A dry non-coking coal, high in carbon, with sufficient volatile matter to kindle it quickly; one with but little or no sulphur and a low percentage of ash, affords the most desirable coal for domestic use.

It has been said that the story of the formation of coal is both instructive and interesting and, if that be so, the story of and the methods of obtaining the valuable products to be derived from bituminous coal, through destructive distillation, are equally, if not more so and it reads more like a romance than a cold recital of facts. By destructive distillation is meant the process of heating an organic

compound in a closed vessel without access of air and the collection of its products. If bituminous coal be placed in a closed retort and heated, there results from such heating four principal products: gas, water liquid, coal-tar and coke. The gas thus formed is not yet fit for illuminating purposes, but must be purified. In the course of this purification, the gases are passed into a tank nearly filled with water and from them, the ammonia, produced by the combination of hydrogen and nitrogen evolved, is rapidly absorbed. This then is the gas or ammoniacal liquor which is the principal source from which ammonia is derived. If the gas liquor be heated with lime and passed through diluted sulphuric acid, we obtain crystals of Sulphate of Ammonia, so valuable as a fertilizer.

There are many other products of industrial value associated with ammonia. Much of the gas liquor of gas works is sold to chemical works, yet much is still permitted to waste.

Coal Tar

This product of the destructive distillation of coal was once too, like the gas liquor permitted to go to waste, as there was little or no demand for it. Its value, however, has long since been known. From this ill-smelling, to many, a disgusting and unattractive mass, there are today prepared more than six hundred products. Among these are the almost endless varieties of aniline dyes, paraffin, naphtha, benzol, anthracene, pitch, naphthaline, carbolic acid, creasote, picric acid, and many additional surgical and medicinal preparations.

WASTES

When we view the black dense smoke belching forth from chimneys, the stacks of mills, factories and locomotives, we are reminded that the waste must be, in the aggregate, enormous. In London, where estimates have been carefully made, the loss of coal in smoke when burned in open grates is between one (1) and three (3) per cent. and that of the volatile matter is about ten (10) per cent. Careful firing in factories and mills and on locomotives reduce this waste, but while we have cheap coal and the Legislature permits the careless firemen to load the atmosphere with particles of unburnt carbon, we cannot expect to have these wasteful methods abolished. The beehive type of coke oven, so generally used in Pennsylvania, is one of the most wasteful contrivances ever invented, and from these thousands of ovens there have passed off into the air smoke and vapor which had they been saved, the value of the products would run into millions of dollars. Some day this waste may cease, but not, perhaps, for many years to come.

The appended table was prepared a number of years ago for private use. It has been found to be of great value and will prove so, no doubt, to such of our farmers who live and own coal lands in Western Pennsylvania.

CORRELATION TABLE.
THE COAL MEASURES OF WESTERN PENNSYLVANIA.
Compiled by BAIRD HALBERSTADT, *Engincer*, *Geologist and Prospector*, Pottsville, Pa.

| Prof. J. D. Dana's Table of Formations. | Table of the Second Geo- logical Survey of Penn- sylvania. | Names Provisionally Adopted by Prof. Lesley. | Num- bers. | Coal Beds in Each Series and Their Thickness. |
|--|---|--|--------------------------|--|
| Upper Coal Measures, ---- | Upper Barren Measures, 1,100-1,200 ft. Upper Productive Coal Measures, 350-450 ft. | Greene County Group, 300- 400 ft. Washington County Group, 700-800 ft. Monongahela River Series, 330-450 ft. Barren Measures, 600-650 ft. | XVII XVI XV XIV | Windy Gap (1' 0"-2' 0"), Nineteh (1' 0"), Dunkard (1' 0"-1' 3"), Jollytown (2' 0"-3' 0"), Washington A (4' 0"-5' 0"), Washing- ton (5' 0"-8' 0"), Little Washington (0' 6"-0' 10"), Waynes- burg B (1' 0"-2' 0"), Waynesburg A (3' 0"-4' 0"), Waynesburg (4' 0"-10' 0"), Uniontown (3' 0"), Sewickley (5' 0"- 6' 0"), Redstone (3' 0"-5' 0"), Pittsburg (4' 8"-19' 0"), Little Pittsburg (1' 0"-2' 0"), Elk Lick or Barton (2' 0"-4' 0"), Platt or Crinoidal (1' 0"-1' 8"), Bakerstown or Price (3' 0"- 4' 0"), Masontown or Brush Creek (0' 6"-1' 0"), Mahoning (1' 0"-3' 0"). |
| Lower Coal Measures, ---- | Lower Productive Coal Measures, 250-300 ft. | Allegheny River Series, 250- 300 ft. | XIII | Upper Freeport (E) (1' 0"-6' 0"), Lower Freeport (D) (4' 0"- 7' 0"), Upper Kittanning (C) (0' 6"-3' 0"), Middle Kittanning (C) (2' 0"-4' 0"), Lower Kittanning (B) (3' 0"-4' 0"), Clarion (A) (3' 0"-5' 0"), Brookville (A) (4' 0"-5' 0"). |
| Millstone Grlt, ----- | Pottsville Conglomerate, 200-300 ft. | Pottsville Conglomerate series, 200-300 ft. | XII | Mercer, Upper (0' 4"-3' 6"), Mercer, Lower (0' 8"-3' 1"), Qua- kertown (1' 0"-2' 0"), Sharon (1' 6"-4' 0"). |

The CHAIRMAN: You have heard the report. What action will you take upon it?

MR. GLOVER: I move the report be received and published in the journal of our proceedings.

The motion was seconded, put and agreed to.

The CHAIRMAN: The next on the program is the Report of the Meteorologist, Mr. E. R. Demain, Harrisburg, Pa. Is Mr. Demain present? He does not seem to respond, so we will pass to the next topic. The next on the program is the Report of the Ornithologist, Prof. H. A. Surface, Harrisburg, Pa.

Prof. Surface then read his report as follows:

REPORT OF THE ORNITHOLOGIST

By PROF. H. A. SURFACE, *Harrisburg, Pa.*

Mr. Chairman and Members of the Board: It is my pleasure and duty to submit the following as report of your Ornithologist for the year 1910. With but one exception, the year has not been characterized by any remarkable feature of Ornithology in Pennsylvania, besides the growth of that steady, strong and healthy sentiment for bird protection, for both practical and ethical reasons, which has been so valuable in giving Pennsylvania its deserved reputation for results in this cause. Only yesterday one of America's great agricultural speakers and writers, Mr. George T. Powell, in charge of the Extension of Agricultural Experimental Work, with office in New York City, remarked in this building that "it is recognized that Pennsylvania leads the Union in its strong sentiment and good results for bird protection." We must acknowledge that it is our opinion that this is due to the combination of three essential factors: First, public sentiment; second, judicious legislation; and third, the co-operation of all officials as well as private citizens for the proper enforcement of our laws.

The public sentiment has come, in great part, from the work of this Board, by providing that annually this subject shall be brought to the attention of our citizens through the Report of a Specialist in Ornithology, which is published and freely distributed, and the growth of this sentiment is further augmented by the Bulletins on bird preservation by the Bureau of Zoology, of the State Department of Agriculture, by the work of our Pennsylvania State Branch of the National Audubon Society, and by the work of Dr. William Dutcher, of New York City, and other officers of the National Audubon Society, produced by the use of Leaflet Literature, which has greatly aided in maintaining the interest and widely disseminating information concerning birds and other untamed creatures.

We should make special mention of the excellent work of our State Game Commission, with Dr. Joseph Kalbfus as Secretary, in creating sentiment, and especially enforcing legislation for birds and game protection. That law which made it illegal for an unnaturalized foreigner to carry a gun in the State of Pennsylvania has proven of vast benefit to our agricultural resources in protecting our song birds and insectivorous birds, and has likewise greatly aided our State forestry interests, as these birds are even more essential for the destruction of woodland pests than for the destruction of those of the field or orchard, because with our modern methods of pest suppression, we are able to control most of our injurious insects of the orchards by the spray pump when occasion arises, but this is practically impossible in the woods.

ARE BIRDS KILLED BY SPRAYING?

At this point we should offer an answer to the above question which is now so frequently asked. It is sufficient for us to say that we have never been able to learn of any definite case of this kind, and if anyone should find dead birds near sprayed crops, where arsenical poisons have been used, and suspect their death to be due to this cause, we shall be glad to have such birds sent immediately to us at Harrisburg, by mail or express, for careful chemical analysis of the stomach contents.

Dr. E. H. Forbush, Ornithologist of the State Board of Agriculture, of Massachusetts, has published in his Annual Report of the State Ornithologist of that state for 1909, the results of his careful investigations along this line, after having very widely advertised for specimens of dead birds for analysis. His results are as follows:

"The investigations of the last three years have shown only two birds that were possibly killed by the arsenate of lead. When we consider the effective advertising that this investigation has had, the number of people who have been on the lookout for dead birds where spraying has been done, the few birds that have been received and the very small percentage (two birds) in the case of which the fatal poisoning by arsenate of lead seems even possible, it seems hardly worth while to continue the investigation."

BIRD COLONIZATION

Very successful results have attended the efforts of many persons who have attempted bird colonization, or at least who have done something toward providing for and retaining certain species of birds around their premises.

Among our recommendations in this practical and important line were the following: Erect for the wrens, small boxes or houses with the entrance not more than one-inch in diameter. This excludes the English sparrow. Erect boxes or leave old stumps or branches with holes for the bluebirds. Leave a few old snags for the woodpeckers, which are among our most beneficial friends in destroying the Codling moth and other insects of the orchard, as well as many forest tree pests. Plant a few of those shrubs, vines, bushes and trees that will afford, not only bird protection or concealment, but also bird food. Among these varieties are the service berry, also

called "shad berry" and "June berry," and known botanically as *Amalanchier*; the hackberry, the wild grape, the English and American ivy, all possible varieties of mulberry and sweet, soft early cherry, such as the Governor Wood. Detailed statements of the methods of attracting birds were published a few years ago in the Monthly Bulletins of the Bureau of Zoology, a few copies of which are yet available for those persons especially interested. We were surprised and gratified at the showing of hands made last night in the meeting of the State Horticultural Association when Mr. Powell asked how many persons had wrens nesting on their premises. Over fifty hands went up.

THE ROBIN AND THE CHERRY

This has been the bone of contention, or *Bete noir* of the horticulturist. During the season while its young are in the nest and the robin must find food to meet its growing demand, ripe fruits of any kind are liable to be attacked. This can be avoided by planting sweet fruits which its prefers, and which ripen at the same season, such as the shad berry, the Governor Wood cherry, and early mulberry.

We have had many inquiries from persons who wish to aid the birds to colonize around their premises. The following is an example of a reply sent to an inquirer in Lock Haven:

"Replying to your recent letter concerning the erection of Martin Houses, I beg to say that the best way to induce the martins to nest around the premises is to erect houses suitable to their needs, and really I believe it is about the only means. These birds have no evil habits. They will not eat your bees, neither will they molest nor drive away your other birds. While they are wholly insectivorous, yet I have never known of a case of their being destructive to the honey bee. They are very interesting birds, and are worthy of your efforts for the propagation.

"If you wish further information on the subject, it would be well to write to Mr. Warren Jacobs, Waynesburg, Pa., enclosing forty cents for his booklet on Martin Houses, and Methods of Attracting Martins to the Premises. He has propagated them by the hundreds, and is very practical in his suggestions. I also shall be glad to aid you all that is possible."

In beginning this report we said that "with but one exception" the year has not been characterized by any remarkable feature of Ornithology in Pennsylvania. This exception, which becomes quite noteworthy because it is so remarkable, is the starvation of young insectivorous birds during the spring and early summer because the weather was so cold and wet that their parents could not find enough food for them. This is well expressed by a valued correspondent, Rev. J. R. Heckman, of Johnstown, Pa., who, under date of July 2nd, wrote: "The long, wet weather, with temperature much below the average, that has continued well up into June, has caused extraordinary happening, viz., the swallows were here about as in other years, but I have seen but one solitary swallow from the end of the cool weather up to the present time. It is thought that the unfavorable weather, probably, was a cause of the shortage of their food supply, which either caused them to starve or leave."

THE ENGLISH SPARROW

The English sparrow continues to be our greatest bird nuisance. Mr. Ira R. Foulk, of Schuyler, Northumberland county, wrote as follows:

"Is there any method of ridding our farm buildings and surroundings of the sparrows?

"Sparrows are very annoying to us. They harbor about the buildings in a large flock, and in the spring drive all other birds away from here, such as bluebirds, wrens, etc.

"Thanking you in advance for an exterminating medium, if there is any, I am,

"Respectfully,
"I. R. F."

To this I replied as follows:

"Replying to your letter making inquiry for a method of ridding your premises of sparrows, I must say that I recognize the objectionable feature of these birds, and agree with you that it would be well to suppress or destroy them. The U. S. Department of Agriculture has issued a bulletin on this subject which can be had free by writing to Washington, D. C., for it.

"One of the most successful means of destroying the English sparrow is to poison millet seed by soaking it a short time in a solution of strychnine and water, and then mixing some of these poisoned seeds with ten times their bulk of unpoisoned seeds, and put them where the sparrows can get them to eat, but where they will not be dropped on the ground to be picked up by poultry. Various kinds of traps and snares have proven useless for sparrows, for the reason that these birds are too shy to be caught in numbers in any device of this kind.

"Proper precaution in destroying or preventing nesting sites for sparrows is one means of preventing their multiplication around the premises. Often the corner of a building near the roof furnishes a place upon which a nest can be placed, while this could be prevented by boarding up or covering with a screen of coarse wire. Holes in walls or trees or buildings afford excellent places for sparrows to nest, but these could be closed by fastening over them a board with an opening one inch in diameter. This would permit the wrens to enter while the sparrows would be obliged to stay outside.

"It is not difficult to find the nesting places of these birds when they commence nesting in the spring time. A person can easily watch them and see them carrying straws, feathers, etc., to their nests. It is best to locate them, and then wait about two weeks, and then destroy them, and the eggs or young will be destroyed with them. Some persons go so far as to place favorable nesting boxes for the sparrows, where they can be reached and the contents removed at night at regular intervals during the nesting season. Thus the sparrows, not seeing the disturber of their nests, and not knowing it is a human being, are liable to continue nesting at the same accessible place.

"Four years ago Hon. Mr. Barnhart, of Johnstown, introduced a bill providing for the investigation of the habits of the English sparrow, and looking toward methods of its destruction. Very unfor-

unately this bill was ridiculed to death. It was, as you can see, a good and important bill, and would have been of immense value. I hope to see something further undertaken by this Legislature."

RABBITS KILLING TREES

There was considerable complaint last year concerning rabbits killing trees, and there is at present a popular tendency to paint the trunks of trees with axle grease to prevent this. Our recommendations have been against the use of axle grease on trees, for the reason that it is not of uniform composition, and while one brand may be safe on a tree another brand may destroy it. Also, there are known and tested methods of preserving the trees from injury by rabbits, and it is better to follow known methods, and leave the experimenting to those who are trained in experimental work, and will do it carefully and properly.

From a correspondent in Hanover, York county, we received the following letter:

"Last winter I used axle grease to paint young trees, and keep the rabbits and mice away, and I noticed it burnt the bark. Can you recommend something better?"

Our reply was as follows:

"Replying to your recent letter, I note with interest that you injured the bark on your trees with axle grease applied last winter to keep away mice and rabbits. I have had this experience at other times, and this is why I have not recommended it. You do not state whether your trees are apple or peach, but I can say that you would have no difficulty nor bad results in painting your apple, pear and quince trees with pure white lead and raw linseed oil. It will keep the mice and rabbits away, and will also keep out borers, and will not injure the trees. I have used it on my peach trees without injuring them, but for some reasons can not feel sure in recommending it to others for peach and plum.

"Spraying or washing with the boiled lime-sulfur wash, home-made or commercial, will effectively protect your peach trees. Tramping straw down around the trees will protect them from mice, and cutting off branches from old trees, which may need to be pruned away anyhow, and dropping these on the snow in such a way that the snow will not entirely cover them, will often bait or feed the rabbits in such a way that they will not attack the trunks of the trees.

"Rabbits generally do not gnaw trees until the snow has been on the ground for some time. This will give you an opportunity to hunt them and destroy them. I certainly recommend killing rabbits as pests at any time of year they are to be found injuring an orchard. I understand that it is not against the Game Law if they are killed because they are injurious to the trees."

THE PROPOSED STATE GUN LICENSE LAW

The Game Commission and others have proposed that Legislation be enacted providing for the licensing of guns to be used for the purpose of hunting in this State. In general, it provides that a

license fee of one dollar be paid by any person hunting in Pennsylvania, excepting on his own premises. This law would result in preventing hunting by many careless and irresponsible persons, and especially would make it possible for landowner to ascertain the name of the hunter immediately upon demanding to be shown his license, which according to the provisions of the law he is to carry with him when hunting. It would thus give protection to the farmer, such as he does not now have. At the present time it is impossible for us to protect our premises, livestock or families from the unknown gunners, who are often as fully bound upon errands of destructive trespass and petty thievery as upon the mission of hunting. We have no way of learning the names and addresses of such persons, and there is no method by which we can arrest them on the spot. To be obliged to go to town to swear out a warrant for their arrest, means to give them time to escape into the next township or county, or to other regions unknown, before we can return.

The Gun License Law would also provide funds for the payment of wardens and bounty, and would certainly result in giving the farmers better protection and increase game, which are desirable. We, therefore, recommend the co-operation of this Board with the Game Commission and others in securing the passage of such legislation.

LEGISLATION FOR A LICENSE OR TAX ON CATS

It is well known that among the most destructive enemies of the birds in the populous residence districts, and on farms or orchards are house cats, which in many cases are half starved and run wild, are forced to capture birds for their food. If legislative acts can result in preventing the forsaking of cats along highways, abandoning them when moving, or permitting an increase beyond a desirable number, this will certainly be useful in bird preservation, and is, therefore, to be recommended. All of which is hereby respectfully submitted.

MR. HUTCHISON: What do you mean by the gun license law?

PROF. SURFACE: I mean the proposed law now in the hands of the Game Commissioner providing for a license fee of one dollar to be paid by each person who is to carry a gun and hunt in Pennsylvania.

MR. HUTCHISON: You endorse that, do you?

PROF. SURFACE: Yes, sir.

MR. HUTCHISON: Including the owner of the property?

PROF. SURFACE: The law includes the owner. That feature I do not endorse. I do not think the man ought to be obliged to pay a license to hunt on his own property.

MR. HUTCHISON: You know the proposed license law will cover everybody with no exceptions in it?

PROF. SURFACE: Yes, sir.

The CHAIRMAN: You have heard the report. What action will you take upon it?

MR. HUTCHISON: I move that the report be received and published in the journal of our proceedings.

MR. GLOVER: I second the motion.

MR. HUTCHISON: Mr. Chairman, before that motion is put I would like to know the status we occupy at this time. There are certain recommendations in that paper, and will it be taken for granted if we vote in favor of this motion that these recommendations are made by this Board?

The CHAIRMAN: I don't think that is the understanding.

MR. HUTCHISON: I don't think that it would be our endorsement, because I cannot endorse that portion of the report that places a burden upon the tax-payer there and the citizens of this Commonwealth that that recommendation would do. Though you may not own farms near cities and desire the hunter to come out and trespass, yet you think for a moment the pleasure that that man has. He may be a laboring man, working in the mines, as near where I live. I have forty acres of land lying near a mine bank where these men labor with their hands and I never put a notice up. There were twenty-four turkeys on there last year—there is nothing selfish about me—and I allowed them to go on there, and they go a day or so at a time and only two got a turkey. If you start to work in this State to place a tax on every man who goes to hunt for a day or two think what trouble we will bring down on our heads and what little benefit it will be to us. In the first place I don't think this bill will get into the Legislature or come out of the committee or become a law, because in the city of Altoona I see through the daily paper there are forty-five petitions signed by hundreds of people protesting against this and there are hundreds of others going up all over this State against this measure to take one dollar from each man that goes out to hunt. Don't let us go on record as taking away that liberty, that pleasure from our fellowmen, the men who labor hard and toil ten hours a day to purchase enough to live on, and we who are more fortunate and live out in the open country ought not to make him pay a tax when he comes out to hunt a little in the country.

The CHAIRMAN: I wish to say that I sat with the Legislative Committee last night until about midnight and we got chuck full of this hunting law and I think the Committee will give a report here on that subject that you can act on and vote for or against it. There have been enough suggestions and amendments offered to make a volume in our law book.

MR. WALLACE: Might I ask Prof. Surface a question: I would like to inquire whether in throwing poisoned millet seed about there would not be danger of poisoning other desirable birds as well as the sparrow?

PROF. SURFACE: We think there would be very few seed-eating birds that would be feeding at that time of the year. If put out in the fields in winter time there would be danger of killing the field sparrow and song sparrow as well as any other sparrows, but around our buildings I think there would not be.

The CHAIRMAN: Any other questions? We will have to move along.

The next number on the program is the Report of the Entomologist, Prof. Franklin Menges, York, Pa.

PROF. MENGES: Gentlemen, I shall discuss this question from the economic side more than any other.

Prof. Menges then read his report as follows:

REPORT OF ENTOMOLOGIST

By PROF. FRANKLIN MENGES, *York, Pa.*

Insects of every description that usually infested this State continued their depredations during the year 1910, with as much fervor as in any previous year. The San José scale and all other scales, the aphides of every description, the potato bug, the cut worm, the loop worm, the wire worm, the cabbage root maggot, the apple and peach tree borers, the codling moth and the clover root borer, all of them and many others have plied their trade of destruction, and in many instances laughed at our poisonous interpositions. These in many instances were accompanied with fungus diseases more deleterious in their effect in many places than the insects.

The relation of insect and fungus diseases in plant life is so intricate, and in many instances with our present knowledge and with our instruments for observation well nigh beyond our ken. We know that in order that fungi may successfully attack plants, the plant substance must be in a condition to be attacked, and usually climatic and moisture conditions must be favorable for the special fungus to propagate itself. On the other hand when soil and climatic conditions are exactly right for the plant to grow and develop and ripen new tissue quickly, this tissue will be sufficiently strong to resist infestation and the infesting bacterium can do little or no damage. But, however salient soil conditions may be and however solubrious climatic conditions they do not prevent insect infestation, and when plants weakened and wounded by insect depredations the parasitic fungus has prepared for itself a way in the open wounds of insect attacks into which it can and will plant itself, and together insect and fungi will soon, if not checked, weaken the plant and make it valueless or entirely destroy it.

The San José scale and the bird shot blight are concomitants, and the potato bug and potato blight. In the case of soil conditions and fungus disease, the pear blight seems to be dependent well nigh entirely for its development on soil conditions. But not only do insects and fungi act as concomitants, but the insecticides and fungicides, the very substances used for the destruction of these enemies of tree and vegetable life, very frequently have deleterious effects. We take it that whatever the compounds of copper, whether as we used to think, it is the hidroxide, or as Prof. Pickering of England

thinks, that a series of basic sulphates are formed by the precipitation of the copper by the lime in making Bordeaux mixture, that when upon the trees or plants these become soluble by the action of carbon dioxide and moisture and therefore are present in the plant substance and available when needed to check the development of parasitic fungi. In other words the plant is put into a condition to resist parasitic infestations and insect depredations. As already stated whatever the conditions produced in the plant to resist fungus infection the substances that check this infection have a deleterious effect on the plant organs.

In a trial of tree spraying mixtures for fungus diseases, standard Bordeaux mixture made of four pounds copper sulphate and four pounds stone lime and fifty gallons water, Bordeaux mixture and iron sticker made of two pounds copper sulphate and four pounds iron sulphate and six pounds of stone lime with fifty gallons water, and self-boiled lime and sulphur made of ten pounds stone lime and ten pounds sulphur and fifty gallons water, the following results were obtained:

On the apple trees of the same variety in the same orchard on the same kind of soil those sprayed with the self boiled lime and sulphur the fungus diseases were not entirely kept down, but there were no obvious injurious effects on the trees. Those sprayed with the iron sticker and Bordeaux mixture the fungus diseases were kept down and there was little injury to the trees. But the trees sprayed with straight Bordeaux mixture were nearly entirely defoliated. These occurrences are not uncommon, but are by no means conclusive. The iron sticker, which by the precipitation of the iron in the sulphate by the lime water becomes the gelatinous ferrous and ferric hydroxides, is added to hold the insecticides and fungicides for a longer time and in this way prolong tree disinfection and insect destruction. It is obvious from this that in order that spraying in the future may be more efficient that the greatest care and keenest observation is demanded so that we do not inflict greater injury than the bacterium we are trying to destroy would have inflicted, especially is this so as long as we are obliged to use disinfectants that are injurious to the trees, the foliage and the fruit. I said disinfection of trees. I like the term because it brings us face to face with the conditions that confront the physician. He disinfects the room in which patients have been ill with so-called bacterial diseases in order to prevent the disease from being conveyed to others. Here another avenue for investigation opens up into which we have now not time to enter.

An illustration of the effectiveness of insect poisoning and fungus disinfection came under our observation in York county in 1909 and 1910. In one section of this county there was considerable complaint that Paris green did not kill the potato bugs and in some instances even Bordeaux mixture when applied sufficiently early did not in any way check potato blight.

In 1909 there was a scarcity of Paris green in the potato growing section of York county and dealers were obliged to scour the country to secure enough to supply the demand. Over 7,000 pounds were used in one section during this year.

In the vicinity of Brogueville and Cross Roads, York county, a number of farmers whom we visited told us how potato spraying had well nigh completely failed, in fact seemed to have done more harm

than good. Six samples of the Paris green used by as many different farmers were analyzed and the lowest percentage of arsenious oxide combined with copper was fifty-three and seventy-three hundredths (53.73) and the highest fifty-six and twenty-two one-hundredths (56.22), or 3.73 per cent. and 6.22 per cent. higher than required by the State law. This showed that the composition of the poison was all right and that the cause of its failure to kill the bugs must be due to something other than the composition, which was found to be the case. It was found that approximately twenty per cent. of these samples of Paris green did not pass through a screen of one hundred mesh to the inch. In order to make certain that finer grinding was necessary samples of finely ground Paris green were compared with these samples and where the finely ground poison was used the bugs were killed, while those on the plant sprayed with the analyzed Paris green were not killed.

This coarsely ground Paris green was mixed with water, even when constantly agitated the larger particles would sink to the bottom of the barrel and carry with them large numbers of smaller particles. But what was still worse, when these coarse particles were sprayed on the potato leaves they formed centers around which collected a large number of smaller particles making the Paris green so dense that it burned the potato leaves and prepared pores for the attack of potato blight. Not only is this coarsely ground Paris green the cause of trouble with potatoes, but it certainly can not be as effective for killing codling moth and other insects. It should, therefore, be insisted that the Paris green be ground to an impalpable powder so that it will easily pass into the cutting or chewing organs of the insect or larva; that it may be evenly distributed over the foliage and fruit of plants, that it will not burn the organs of the trees and plants and in this way itself do some of the injury for which it is applied and prepare the way for the attack of parasitic fungi as it evidently did in the case referred to.

These observations are not as conclusive as they should be, but from reports of other potato and fruit growers, it appears that we must learn better to prepare these spraying mixtures, or something else must be gotten instead of the sprays now used, that will not injure foliage, fruit or trees; but rather be a benefit such as the self-boiled lime and sulphur spray is.

The CHAIRMAN: You have heard the report, gentlemen. What action will you take upon it?

MR. A. P. YOUNG: I move it be received and published in the journal of our proceedings.

The motion was seconded, put and agreed to.

The CHAIRMAN: The next number on the program is "Some Fundamental Principles in Fertility Maintenance," by Dr. Charles E. Thorne, of the Ohio Experiment Station. As you were informed yesterday, Dr. Thorne is unable to be with us on account of illness in his family, but his assistant, Prof. R. C. E. Wallace is here in his stead and will deliver this address.

Prof. Wallace then spoke as follows:

SOME FUNDAMENTAL PRINCIPLES IN FERTILITY MAINTENANCE

By R. C. E. WALLACE, *Ohio Experiment Station, Wooster, Ohio.*

"The soil is the farmer's business capital. He has invested his money in the land and to it he must look for his returns." What these returns will be depends largely upon the farmer himself.

If he is to adopt a profitable and permanent system of agriculture, he must put into practice the underlying principles which have been found to be absolutely essential and fundamental to the greatest success in the production of crops. He must not be content to maintain the soil in its present state of fertility, but should, if possible, add to the fertility already at hand and thereby increase the productive power of the soil.

One of the well recognized means of bringing about this result—of increasing the productive power of the soil—is that of tile draining! The presence of free water is decidedly harmful to most plants, especially if allowed to stagnate near the surface. When the level of free water is near the surface of the ground, great benefit is almost certain to result from some system of underdrainage. So far as we are aware, none of our agricultural plants will send their roots below the water level; but by means of drains we can lower the water table and so increase the depth to which plant roots may feed. By lowering the level of the free water in the soil we not only increase the amount of root pasturage but open the way for the admission and circulation of air in the soil spaces; a condition absolutely essential to root development.

The admission of air to soils also assists in hastening the decay of organic matter and in the production of nitrates. A soil charged with surplus water is always cold, and the influence of drains in warming the soil is very decided, especially in the spring. More heat is required to raise the temperature of a given weight of water one degree than is necessary to cause the same increase in temperature in an equal weight of soil. Hence a soil surcharged with water remains cold in the spring much longer than well drained soils because the heat from the sun which should go toward warming up the soil is absorbed by the evaporation of moisture. The entire time allotted to this paper might well be devoted to a discussion of this question of drainage, but there are other factors to be mentioned relating to the maintenance of soil fertility, so that we may not linger longer on this phase of the question. But just in passing permit me to urge upon you the importance of thorough drainage. In my judgment it is the first and most important question to be considered in establishing a permanent and profitable system of husbandry.

TILLAGE

Tillage includes all the operations of plowing and preparing the ground for the reception of the seed and the subsequent cultivating of the soil. Good tillage is one of the most efficient means of assisting nature in rendering plant food available. The first effect of tillage is to improve the texture of the soil in the mere mechanical sense; that is, to make it fine and mellow so that the roots of plants may readily pass through it, and that air and water may be more readily admitted; thereby improving the conditions for root development and for the multiplication of beneficial organisms. Some soils are so stiff and heavy that neither roots nor water can easily penetrate them; others are so loose and open that they have very little capacity for retaining moisture. In either case tillage is highly beneficial, especially if accompanied by the incorporation with the soil of liberal quantities of organic matter. Surface cultivation and the establishment of a dust mulch is especially desirable during periods of drought at any time during the growing season.

Man has not yet reached the point where he can regulate the amount of rainfall which falls upon the earth; but by proper tillage methods he can greatly assist the soil in absorbing the maximum amount of that which does fall and at the same time reduce the loss from surface washing; and further, by the establishment of a dust mulch he can in a large measure succeed in holding this moisture in the subsoil for the use of the crop in case of drought.

LIMING

As a means of correcting soil acidity, and as an aid in improving the physical condition of many soils, we have yet to find a substance that is more efficient or economical than ordinary builders' lime. When lime in this form is applied to a rather heavy clay soil it tends to flocculate the fine clay particles by cementing them together into small granules thus making the soil more easily tilled and less liable to bake and crack. In the case of a clay soil, this treatment serves to render the soil more open and porous, thus permitting a freer admission of air and allowing the water to percolate through it more readily. In this sense we can readily see that on such soils lime becomes an important adjunct to thorough drainage. On sandy soils, however, lime has an opposite effect. Such soils are frequently benefited by being rendered more compact, and hence have a tendency to become less leachy in character and to be more retentive of moisture. It should be the aim to increase the organic matter in such soils by the use of stable manure or by the occasional plowing under of green crops.

When viewed in the light of present experimental evidence, by far the more important reason for applying lime to the soil is for the purpose of counteracting the evil effects of free acids which may be present. When the remains of plants undergo decay upon soils deficient in carbonate of lime and magnesia, acid or sour humus is liable to be produced which is a condition particularly obnoxious to most agricultural plants. Such a condition is especially likely to

occur when heavy crops of green manure are plowed down, particularly in hot weather. In such cases liming is an effectual and probably the most economical remedy.

Our experiments on Ohio soils have been shown conclusively that where an application of plant food is required some form of available phosphorous must receive first consideration; but where soluble phosphates are applied to soils deficient in lime and magnesia the phosphoric acid combines with the iron and alumina of the soil to form compounds that are not readily utilized by plants. If, however, the soil be fairly well supplied with lime and magnesia this transformation is retarded so that the plant is afforded an opportunity to utilize much of the phosphoric acid before it becomes unassimilable, the effect of the lime in this case being to assist in maintaining fresh applications of phosphoric acid for a considerable time in a more available form.

In many parts of Ohio, and especially throughout the entire eastern half of the state, it is becoming increasingly difficult to get a good stand of clover where no lime has been applied. On soils which have received a dressing of lime, however, clover will grow luxuriantly even though it refused to grow before the lime was applied. I would say, therefore, especially to those who have trouble in securing satisfactory crops of clover, that they might do well to investigate this question of applying lime to the soil as I should expect much benefit from its use in cases similar to those which I have indicated.

ROTATION VS. CONTINUOUS CULTURE

(For this portion of his address Mr. Wallace displayed a number of charts showing in detail the results of the experiments discussed.)

At the Ohio Station we have two series of tests which have now been in progress for seventeen years, that present some interesting facts as to the value of rotation as compared with continuous cropping both with and without the use of fertilizers and manure.

In one test we have established a five-year rotation of corn, oats, wheat, clover and timothy, and in the other corn, oats and wheat, each having been grown continuously on the same ground for the entire period of the test.

Under rotative cropping the average unfertilized yield of corn has remained practically unchanged for the entire period. The average annual yield at the end of the first five-year period was 31.89 bushels per acre; at the end of the third period the yield was 31.04 bushels per acre—less than a bushel difference between the first and the last period—a difference so small as to make it unsafe to attach to it any particular significance. In the continuous culture plots, however, both the unfertilized yield of corn and wheat show a rapid decrease in yield, the average for the third period being only about half that of the first.

On the fertilized plots the nitrogen is applied at the same rate per acre as Plot 11 in the rotative cropping, and on Plot 2 in the continuous culture, but the corn and oats grown continuously receive more phosphorus and potassium than the same crops in the rotation. At the end of the first five years the corn had yielded slightly more,

on an average, in the continuous than in the rotative cropping and the oats and wheat nearly as much. During the second and third period, however, all the crops in the rotation have made steady and constant gains while the yields on the continuous culture plots have, with the exception of oats, been gradually going down, notwithstanding the heavier application of fertilizer. In the following table are given the yields for each of the three five-year periods both for Plot 2 of the continuous cropping and Plot 11 of the rotation:

| Crop. | Continuous Culture, Plot 2. | | | Five Year Rotation, Plot 11. | | |
|--------------|--------------------------------|---------------|---------------|---------------------------------|---------------|---------------|
| | 1st 5 years. | 2nd 5 years. | 3d 5 years. | 1st 5 years. | 2nd 5 years. | 3d 5 years. |
| Corn, ----- | bus. 44.61 | bus. 47.20 | bus. 38.50 | bus. 41.28 | bus. 49.90 | bus. 54.13 |
| Oats, ----- | 42.22 | 40.11 | 45.46 | 43.61 | 52.48 | 53.49 |
| Wheat, ----- | 19.78 | 21.90 | 17.41 | 20.53 | 27.46 | 33.10 |

In the case of plots receiving barnyard manure comparison is made between Plot 20 in the rotation work, which receives a total of eight tons of manure every five years—four tons each on corn and wheat—and Plot 6 of the continuous culture which gets five tons of manure every year, or twenty-five tons for the five-year period. This rate of manuring has caused the corn yield to rise steadily from less than 39 bushels per acre for the first period, to more than 50 bushels for the third under rotative cropping, whereas the corn under continuous culture has fallen from 43 to 34½ bushels during the same period despite the fact that the plot growing corn continuously receives more than three times as much manure every five years as the corresponding plot in the rotation received for all the crops grown during the same period.

In the rotative cropping the oats crop is not directly manured, receiving only that left by the preceding corn crop—and, so far as I am aware, all our experiments agree in showing that the crop which is directly manured or fertilized receives the major portion of the benefit from the treatment—hence the comparison in this case should be made with Plot 18 in the rotative cropping, which receives eight tons of manure each on corn and wheat, or sixteen tons every five years, against the twenty-five tons applied directly to the oats continuously during the same period. This secondary effect on the oats, of manure applied to the preceding corn crop is shown by the results to be even greater than is the direct effect of the larger quantity applied directly to the oats as we do in continuous culture.

The manured wheat shows a little larger yield in the continuous than in the rotative cropping during the first period. At the end of the second period the wheat in the rotation was slightly ahead of the continuous, while at the close of the third period the yield of the continuous wheat was little more than half that in the rotation.

It thus appears that not only has there been a much greater decrease in the unfertilized yield under the continuous than under the rotative cropping, but that the effect of fertilizers and manure has been much less on the crops grown continuously than on those grown in rotation.

It has not been uncommon during the progress of our fertility work at the Ohio Station to frequently have grave doubts expressed as to the applicability of our plot methods to practical farm operations where fields several acres in extent are cultivated. In order to demonstrate that the plot methods were as entirely applicable to large as to small areas, we began putting into practice on a 40-acre field some of the lessons we have learned from our plot work. This forty-acre tract is divided into four sections of ten acres each on which is practiced a four-year rotation of corn, oats, wheat and clover. For the first ten years after the establishment of the Experiment Station in its present location our practice on this field was to top dress the ground for wheat in the fall, with ten tons of barnyard manure, the other crops following without any further fertilization. Seven years ago we adopted a different plan and began putting into practice some of the lessons above referred to. This consisted in applying ten tons of phosphated manure per acre to the corn ground in the fall, at a cost for raw rock phosphate used of \$1.60. After the ground was plowed in the spring we applied one ton of lime per acre, costing \$6.00. In the fall the wheat ground received a dressing of 400 pounds per acre of fertilizer analyzing 4 per cent. ammonia, 16 per cent. phosphoric acid and 5 per cent. potash, all costing \$3.40, making a total cost of \$14.00 per acre for the entire rotation.

In comparing the results of the two methods we find that for the first ten years before the change of plan the average yield per acre for the entire period was 48 bushels of corn, 52 bushels of oats, 20 bushels of wheat and 2.7 tons of hay; the average of the last seven years since the adoption of the new method, has been 73 bushels of corn, 56 bushels of oats, 37 bushels of wheat and 3.7 tons of hay. Figuring the total value of the increase at the average of prices for the past few years we get a total of \$34.00 for the gain. The cost of treatment we have seen is \$14.00. The net gain therefore would be \$50.00 per acre for the four crops of the rotation, or \$12.50 per acre for each crop each year. This is a greater net return than has been received from any of the plots under test at the Ohio Station, and demonstrates conclusively that good tilling and thorough fertilization are fully as practicable and applicable to large as to small areas.

A Member: Were these experiments all conducted on a well drained soil?

MR. WALLACE: Yes, sir; the land is all drained, the tile being laid 36 feet apart.

A Member: How much lime do you use and how many years between applications?

MR. WALLACE: We think one ton of burned lime or two tons of ground limestone per acre is about the proper quantity for our soil for the first application. For subsequent applications perhaps half these amounts might be sufficient if applied not less frequently than

once in from four to six years. The amount and frequency of application will depend much upon the character of the soil and its need for a lime dressing.

A Member: Does ground limestone rock produce the same effect as burnt lime?

MR. WALLACE: Ground limestone is much less vigorous and more lasting in its action than the burned lime. There is probably no great difference in their ability to correct acidity.

A Member: Has not the burned lime far more effect in improving the mechanical condition of the soil?

MR. WALLACE: Yes, sir; I think there is no doubt of that.

A Member: Do you consider it necessary to lime as long as you can grow good clover without it?

MR. WALLACE: Under ordinary conditions I should hardly expect lime to be very necessary where we can grow heavy crops of clover.

A Member: There seems to be a disagreement as to whether acid phosphate has any effect in promoting acidity in the soil. I should like to have your views.

MR. WALLACE: Where acid phosphate is used continuously for a number of years it will probably have a tendency to increase the acidity of the soil. However, whether we use acid phosphate or not, we find it necessary to use lime and the small amount of free acid which might accumulate in the soil from the continuous use of acid phosphate is so easily counteracted by lime that we do not hesitate to use the acid phosphate.

A Member: Do you think we get enough lime in our soil by the use of fertilizers such as rock and bone meal for the use of crops, without considering the acidity?

MR. WALLACE: With the use of such fertilizers as you suggest, together with the lime naturally present in the soil, I should expect the supply of lime to be sufficient for the needs of the plant if we leave out of account the question of acidity.

A Member: Does a limestone soil ever get acid?

MR. WALLACE: Yes sir. Soils of limestone origin have been known to become acid after years of cultivation. Limestone is slightly soluble in the soil water and where the soil is subjected to thorough tillage for a number of years the lime originally present is likely to become dissolved out of the surface portion even of the limestone soils and carried down into the lower strata.

A Member: There is one of the instructors of the Farmers' Institutes in this State who advocates the application of only 500 pounds of lime per acre.

MR. WALLACE: No doubt there are cases where an application of 500 pounds would be sufficient; on our lime-hungry soils of Ohio, however, we get very little, if any, result from so light an application.

In cases where lime is applied in small amounts as you suggest, it is necessary to make the applications more frequently than when we apply from 1,000 to 2,000 pounds.

A Member: Do you plow your ground before applying the lime?

MR. WALLACE: Yes sir. After the ground is plowed we apply the lime and work it well into the surface of the soil with a disc or spring tooth harrow.

The SECRETARY: This, I think, completes our program for this afternoon. We will have a few minutes before adjournment. I think there is a gentleman in the audience from Perkiomen Academy, an institution of learning in the eastern part of the State, who has a message to deliver. We would be glad to hear from him for eight or ten minutes.

I have the pleasure of introducing to you Prof. O. S. Kreibel, of Perkiomen Academy, Pennsburg, Pa.

PROF. KREIBEL: I want to say just a word to you this afternoon along the line of agricultural extension in school work. Perhaps I ought to say that I am principal of a preparatory school in Montgomery county which ex-Governor Beaver visited some years ago and made an address to the graduates. We have prepared a great many young people for college, many of them farmers, since we are taking the boys away from the farms. It is all right. They make their mark when they get out. They make the best records. At State College and Princeton they made good in scholarship. It is usually the boy from the farm who makes good. We are thinning our country of the best boys and sending them to the cities. If we don't reverse the operation soon we will impoverish our country districts at the expense of the cities. It has occurred to me if we could have some agricultural teaching in connection with schools like ours have some small farms, a farm for dairying, a farm for poultry, a farm for raising cattle, we could interest many boys in that line of work and get a lot of boys to come to these farms and work part of the time and study part of the time and get ideas of scientific agriculture to take back to their farms. We should need a lot of men from State College to teach at these places; and if we had one in every two or three counties of the State it would do a great deal for agriculture that we cannot do now. The State College cannot do it because our boys cannot all go there. They must train men to teach in these subsidiary schools, and I just came here to present this in brief form.

Would it not be a good thing? For instance, if you had such a farm in Perkiomen Valley for three or four counties, and another school in another section, would not these schools be favorable for State College and ought not State College work with such schools and thus carry the message of importance throughout the State to the masses. We have the colleges and the colleges can prepare the teachers for the schools. Now, then, we are going to teach agriculture in the public schools. This, in brief, is my thought. Why should not the State enter upon a regular system of extending our agricultural instruction? They are doing it in other states. Massachusetts has a committee appointed. I have been in correspondence with them and they are to report this winter to the Legislature. They have schools in

Wisconsin, county schools on the same line and organized on the same basis. What I am afraid of is that Pennsylvania will be in the rear of this procession, whereas it ought to be up front. Why should we not be in the lead? We have a great State; we have a great people, a great agricultural people. It needs development, particularly in smaller farms, more successful agriculture, and it seems to me that if the State Board would see its way clear to endorse such a move it will do a great service to the farmers of the State.

The SECRETARY: Now, Mr. Chairman, I want to make a little announcement. I cannot understand why it is that people are so indifferent to their interest as to leave so much upon the table for the Secretary or somebody else. First, we had to send some money to hunt an owner and just before we left the room after adjournment this forenoon I discovered a gold watch upon the table and I have no need for more than one. I have an idea that this is Mr. T. E. Martin's watch, but I don't know. If any of you gentlemen see Mr. Martin, speak to him. If it is not Mr. Martin's watch I would like to know who the owner is. I don't want to carry more than one watch.

Another thing: Immediately upon adjourning here we will go up to the large hall on the second floor, where there is to be the inauguration of the good roads campaign, and we hope that the State Board of Agriculture will have its place there in this important work of starting this train in the right direction.

The CHAIRMAN: What is the pleasure of the Board now?

MR. HUTCHISON: I move we adjourn.

The motion was seconded, put and agreed to.

Whereupon, adjourned until to-morrow morning at 9.30 o'clock.

Thursday Morning, January 26, 9.00 A. M.

A. J. Kahler in the Chair.

The CHAIRMAN: The meeting will please come to order.

The first item on the program this morning is the Report of the Botanist, Prof. W. A. Buckhout, State College, Pa.

The SECRETARY: Prof. Buckhout is not here. I have a letter stating it will be impossible for him to be with us, but he has sent me his report. I would suggest that Mr. Hutchison read it.

The CHAIRMAN: It is suggested by the Secretary that Mr. Hutchison read the Report of the Botanist.

The SECRETARY: If there are any scientific terms in the report which you are not familiar with, you may skip them. I have not read over the report, hoping that there would be something to take up the time until I could become familiar with it.

The Report of the Botanist was then read by Mr. Hutchison, which is as follows:

REPORT OF THE BOTANIST.

By PROF. W. A. BUCKHOUT.

The activities of your Botanist have been directed entirely to correspondence. This varies little from year to year, and generally runs somewhat parallel to the season. Some lines of inquiry are not at all seasonal, but those most frequent are. In spring and fall specimens of seed for purity and character are quite abundant, and during the height of the growing season weeds or conspicuous native plants for naming come in quite rapidly, generally coupled with the inquiry, how can they be exterminated?

Of the miscellaneous inquiries, those relating to special crops are the commonest, and of them mushrooms and ginseng take the lead.

Of the former, the following correspondence expresses my judgment so tersely that I venture to quote it entire, although the context shows that it has already been in print:

To Raise Mushrooms

To the Editor of "The Press."

Sir:—Can you give me an answer to the following questions regarding mushrooms?

1. Are they hard to raise?
2. Is raising them profitable?
3. Is there a good market for them?
4. What price do they bring?

Will be glad to receive any information you can give me on this subject.

A. F. H.

Philadelphia, August 29, 1910.

This question was submitted to the Pennsylvania State College, and Mr. W. A. PROFFER., of the Department of Botany of that institution, sends the following reply:

"Replying to the inquiry of your correspondent 'A. F. H.' respecting mushroom growing, I would answer as follows:

- "1. Not particularly, for those who understand the business.
- "2. In the long run, yes, but partial or even complete failures are not uncommon.
- "3. The market is rather narrow and select.
- "4. The rate, 15 to 50 cents per pound, wholesale, is about the winter's range.

"Your correspondent is evidently a novice. If he desires to proceed further in the matter he should do two things. (1) Visit some mushroom growing establishment and study it thoroughly; (2) write to Department of Agriculture, Washington, D. C., for Farmer's Bulletin No. 204, 'How to Grow Mushrooms.' Mushroom growing is no more like ordinary cropping than cattle raising is like oyster culture."

I should give substantially the same advice regarding ginseng, golden seal, peppermint and others. Each is in a special class by itself, and no one should expect to be able to handle it successfully without the special knowledge which careful observation and experience give. But, over and over again, someone chances on the highly seductive advertisement or newspaper tale of the making of "big money" on a small plot of ground in raising this or that special crop. Deceived by the more or less exaggerated accounts, which carefully avoid any reference to the need of caution, and gratuitously offer their one-sided experience, some, I am satisfied, rashly make the venture which only the most dogged persistence in the face of years of discouragement can turn to success. The same time, money and energy put into some of the albeit common crops would generally give, in the long run, more satisfactory returns.

It is gratifying to see that the necessity, as well as the advantages of pure seed, is becoming increasingly evident to farmers and gardeners. Many have come to have a wholesome fear and dread of dodder, and hence to scrutinize clover and alfalfa seed very carefully before they use it, and to require some warrant that it is free from at least this pernicious pest. Weeds, like the poor, we shall always have with us, but reasonable care in the purity of seed used, careful cultivated crops, and due regard to maintaining soil fertility will so hedge about and restrict them that they need not be feared. I have little faith in the practicability of weed destruction by spraying, at least under the ordinary conditions which appertain in Pennsylvania, whatever may be the case in the large, uniform, unobstructed fields of other regions.

When one considers the resisting power possessed by our old weeds so long entrenched and habituated to their surroundings, it seems idle to expect to control them except by the most vigorous counter-acting measures, such as have been used for all time. Spraying with iron sulphate, salt and the gardener's weed killers of various sorts may have their place, but only where the conditions are fit, and then one must carefully count the cost of machinery, materials and time, or he will be left in the lurch. Unsatisfactory as such replies may seem to be to my anxious inquirers, I can seldom answer them in any other way. So long as life is a struggle and a competition, so long must the obstreperous weeds be crowded out and kept out by stimulating our useful plants to their most vigorous growth. Specifics have small place in weed killing.

From time to time I get specimens of grass containing ergot or spurred rye. So characteristic and so plain are such diseased grains that it seems strange so few farmers or farmers' boys recognize them on sight, the more so since ergotted grains are such insidious poisons and in all probability are the frequent causes of the sickness of animals and sometimes of their death. It is true that well con-

ditioned animals with a liberal food supply are generally discriminating enough to reject ergot, but it must sometimes happen that an over hungry animal or a weaker animal crowded by its fellows may snatch, hastily masticate and swallow the ergotted material which, if at ease and leisure, it would reject.

In the last few years I have had several cases of ergotism reported to me, and your veterinarian has likewise recorded a number of very pronounced examples. I shall not take your time to rehearse them, but should any of you be directly interested you will find these cases in former volumes of your proceedings; my own in Report of Pennsylvania Department of Agriculture, 1906, page 340, and that of Dr. Pearson in the Report for 1902, Part 1, page 161.

Few instances could more conclusively show the value of some practical knowledge of botany and zoology. We are making some progress in getting such facts as these before the people, and in getting the people stirred up to pry into such matters for themselves. But the losses to farmers due to ignorance of natural phenomena and natural principles is still appalling.

The CHAIRMAN: You have heard the report. What action will you take upon it?

MR. HUTCHISON: I move that the report be received and printed in the journal of our proceedings.

The motion was seconded, put and agreed to.

The SECRETARY: Mr. Chairman, at the afternoon session on Tuesday the Report of the Economic Geologist, Dr. Isaac A. Harvey, was called for and the statement made that he was not present, but that he had promised to send in his report which had not at that time arrived. That report is here this morning and if it be your pleasure I will read it or it can be received without reading, if you so desire.

MR. BLYHOLDER: Mr. Chairman, I move the report be received and published in the journal of our proceedings.

The motion was seconded, put and agreed to.

The report of the Economic Geologist is as follows:

REPORT OF ECONOMIC GEOLOGIST

By DR. ISAAC A. HARVEY, *Lock Haven, Pa.*

Speaking in a general sense, perhaps no other branch of natural science is so much neglected, and hence so vaguely comprehended, as geology. This fact may be due, in a great measure, to the broad range of its meaning and the wideness of its scope, by association with the other sciences, as well as the difficulty of attaining an intelligent knowledge of its details, and from the fact that, commonly, we are more interested or anxious to learn or know more about those

certain branches of knowledge or science that can be more readily learned or utilized and afford promise of more immediate pecuniary profit or advantage.

Will it pay? is a query that seems to dominate the average American mind and explains much of the indifference with which we regard one science and the zeal or earnestness with which we pursue or study another. Hence, when the question of the mineral resources of a given locality or district arises, in very many instances, the residents and land owners are not prepared or much concerned to investigate, estimate or even conjecture what minerals of commercial or economic value may be obtained in the rock strata as they may outcrop on their properties. They are not so much interested in the possible minerals beneath the surface as they are in the matters and affairs above the surface; and this fact suggests many instances of the dense and ridiculous ignorance of this science that have come under my observation while engaged in making investigations and researches in various counties and states.

Almost anywhere or everywhere I have found people who can relate stories or traditions of supposed or reported minerals of fabulous quantity or value, and often have I been assured that coal, iron ore, gold, silver, lead, copper, zinc or other minerals are really present or to be found in certain places or localities; only to be revealed, however, to me or some one else, upon the payment of a round sum of money; and, the money not being forthcoming, the knowledge of the whereabouts of the reputed mineral discovery disappears with the man "who knew all about it;" but, who, nevertheless, went away or died in penury and poverty without even disclosing the facts to his indigent and helpless heirs.

The absurdity of very many of these tales, geological legends and traditions, is made evident and manifest to one having some practical knowledge of geology, by the fact that the reported deposit is usually said to be in some strata, mountain, hill or valley, whereof the rock exposures, geological structure or period absolutely forbid the presence of such mineral, or wherein it is not possible for such values to be present from the very character of the formations thereabouts. These various tales afford no small diversion and amusement during the somewhat irksome labor of exploring or prospecting properties, and it is wonderful what credulity and expectation in outlandish places. Some are sincere and honest; others are engaged in deliberate deception. Thus, a certain squatter and hunter, in one of the adjoining counties, related to me how he had discovered coal, iron ore and other valuable mineral deposits, among which was "a bed of steel four feet in thickness." Having some knowledge of the man's thieving propensities, for he had such a reputation, I was disposed to say that I knew where there were six feet of steel (steal); but my misgivings about the effect of such a remark restrained me from making it, as a passage at arms, at that place, would not have been to my advantage. A local preacher in Cameron county agreed to show me where he had opened four feet of coal, but when we arrived at the place and he reopened the pit, evidently sunk many years before, no coal appeared and none could have been formed in the rock period in which he had been digging. This seemed to be a clear case of geological fancy, dream or delusion, as the man was of good repute and evidently sincere.

Men of this kind, and harboring such fallacies and notions, are to be found in almost every community; such, for instance, as the young man in one of our small towns, who found (?) an excellent specimen of gold quartz while sitting near a spring under a ledge of rocks; others in our county, and doubtless in most of the other counties, who have discovered magnetic iron ore in large amount and have shown splendid samples thereof to credulous, though intelligent, merchants, lumbermen, farmers, and occasionally even a lawyer. These smart "Alecs" and local prospectors, of their kind, usually know, or profess to know, the whereabouts of the ore, but fail to show it; and the deception intended or the ignorance that besets the minds of these fakirs is obvious from the fact that magnetic or red hematite iron ore, or other mineral claimed as stated, has very rarely or never been found in the rocks which are represented where these men profess to have located the said minerals, and the samples are too pure and rich for outcrop ore. Specimens of nearly every conceivable kind of rock or mineral, so called, have been sent to me for inspection and opinion, and, in nine instances out of ten, they are worthless. I have very frequently been asked to examine a certain tract or property where, as tradition has it, the Indians were wont to find lead or silver, or both, and assurances are offered me, orally, that other minerals are nearby, and there is such a medley of these things in my experience, that the vagaries attending the notions seem, oftentimes, to indicate a species of dementia, even beyond the incidental delusions that may, for a time, possess the minds of others who are misled in these matters.

Now, while the minerals are not absolutely excluded in all instances by our geological experience and knowledge, from the strata named as containing the "fine prospects" affirmed, yet the matter of discovery, as described, and the vagueness that attends the information relating thereto, constrain me to yield very little credence to any of these fables or reports, unless some additional or more definite evidence is afforded of their truth.

Good samples of magnetite or hematite may be found on the cars, passing through the town or village, and the same will serve the purpose of "truthful James" in his efforts to mislead and in his geological researches, and he carries his specimens with so much assurance, for the inspection of "gullible" people, that one can hardly question his honesty or sincerity, unless possessed of a fair knowledge of the geological conditions at the place of supposed discovery. Some fine gold or silver, or perchance, copper ore, received furtively from friends in the West, may afford the basis for a fortuitous or anamalous discovery of kindred quartz or ore not far from the city, town or village where these cranks have their abode. So it is, also, with lead, zinc, marble, etc., and the finding of a lump of iron pyrites, as bright and beautiful as gold itself, is sufficient to make a fool of the finder and perchance, many fools among his neighbors; for iron pyrites has deservedly the name of "fool's gold."

Of geological cranks there seems to be quite as many as there are of the typical religious cranks and both peradventure, of equal blessing and advantage (?) to the communities wherein they may dwell. Such there are, many of them, who can discover imaginary values in nearly every stratum or layer of rock, or even stone and in the hill, valley or mountain; and many times their geological superstition,

for such it may be called, leads them hither and thither in search of undiscovered mineral wealth of which they dream, in wild and fanciful error and delusion through a lifetime of penury or indolence. Many people intelligent and successful in business, farming, mercantile, professions, have been persuaded by such "big prospectors" to believe in the probable presence of valuable coal, ore or other mineral in places where such deposits have never been found by subsequent investigation. It is for this reason that I have adverted to the hallucinations, fallacies and absurdities of some prospectors and pretenders, who seek, either blindly or ignorantly, for mineral values and wilfully mislead people who have given the subject very meagre thought or study, when a moderate knowledge of geology would enable them in most instances to locate anything of value or readily determine, at least, whether an investigation is wise or expedient.

In my library at home are books containing thousands of pages descriptive of oil and gas, their genesis or origin, and the wells through the State, many dry and some productive. Of these two important factors of manufacture and commerce as well as of domestic convenience and comfort, doubtless, there are accessible in our public libraries many books containing elaborate discussions of the same subject and covering in the aggregate fully ten thousand pages. However, it seems to me, as one having given the matter of production and continuance of the oil and gas supply, that there is no other problem in the wide domain of practical and economic geology that is further away from entire knowledge and perfect comprehension or solution, and no other subject in this science that so much engages the close and assiduous study and attention, in the gas and oil producing states at least, as the one relating to the location, intelligently and accurately, of productive wells thereof, and ascertaining the certain trend and probable extent of the oil and gas pools or reservoirs, so-called, and the length of time in which they may be expected to afford a supply for practical use.

In our State, as well as in others,—and notably Virginia and West Virginia—we have the history of the appearance, more than a century ago, of oil or gas or both issuing in a meagre way from their subterranean source or origin; and, later, the actual finding and locating of some of the pools by tentative or experimental drilling in certain districts. But not until the very recent years were wells located and the valuable results obtained upon any definite geological deduction, rule, method or indicated facts, whereby the driller could intelligently select the site or position of his well with reasonable certainty of a favorable response to his efforts.

Hence, the investigations, formerly, were left entirely to the somewhat erratic discretion or notion of men, who, without any distinct ideas or knowledge of geology, were seized, perchance, with the vague and indefinite idea of "putting down wells" to find gas or oil, and declining the suggestions of geologists, who in a limited sense at least, had scientific views of ideas with reference to the actual location and approximate depth from the surface of these desirable products of the rocks and sands; and who, also, by degrees acquired such additional data and facts from the experimental drilling as to deduce such definite and positive conclusions that eventually became a guide to the driller, who, formerly, was wont to ridicule and dis-

parage the scientific views or aspects of the subject and make sport of the well read and carefully trained geologist, his rules, formula and science.

Without any claim or assumption of a thorough knowledge or mastery of the oil and gas question, nevertheless, I have never been impelled to venture into a theory that would define the approximate limits of the "oil and gas fields" or in any sense approve a map, at best conjectural, that would purport to circumscribe or measure the territory whence these products might be derived. The possibilities of paying wells have been so much extended and increased and the outlying and isolated oil or gas districts and the "lone" productive wells are so far apart from the original districts as traced on the maps, long since published, that one at this late day who would assume to conjecture or figure absolutely what extent of territory is barren and what productive, may justly be termed a tyro, fakir or empiricist and places himself within the province of rational, consistent and scientific geology and acquired truth in that respect.

The theory that oil, with its associated gas, is only found in a trough or basin, while the gas alone may be located on an anticline, its slope or arch, by certain drillings, does not obtain everywhere, and the assumption that oil cannot be found on the slopes of anticlines has been nullified by recent experience and by the highest scientific authority. But the contention yet remains, with very many people, that gas alone should be sought on the slopes and arches of anticlines, as being derived from oil in the basin proper and finding its way from the oil pools to the slopes and arches through continuous rock fissures, the oil, of course, being supposedly present in or near the bottom of the trough; that is, close along the synclinal axis and one or more miles from the point where the gas issues from the well, as drilled. In other words, the oil should be in the trough between the anticlines that have their respective crests on each side of the basis of the trough. The facts that might seem to establish a theory and distinguish it as a rule to be applied with exact certainty and verification in certain localities, or even states, may not suffice for a certain guide or rule in other localities or states.

Much remains yet to be learned and proved by years of experience and careful investigation, and the somewhat exceptional and anomalous discovery of gas and oil beyond the assumed limits of a district or basin and located by guess or random, affords no basis for a methodical drilling by a rule or assumed sequence derived, in part, from the well known and thoroughly tested fields where the trend and outline of the oil pools, at least, may be fairly understood and surveyed.

Such isolated districts as Gaines, in Tioga county, have no precedent in the discoveries of many years ago, but, however, much oil or gas may be hereafter derived from this field, the very pertinent query arises, whether along the trend of the several wells that have been productive and ceased as of those that still afford some oil, there may not be other localities northeast or southwest, that will, in some measure, greater or less, respond favorably to the drill. Therefore, we may logically expect new efforts, made in an intelligent manner, to be repaid by the revelation of new fields.

Broadly speaking, geologists have so arranged and formulated the great mass of information, otherwise not so accepted, as to be able

to afford to the driller more definite suggestions as to the locality that promises success, than the driller is willing to accord to the geologist.

In some measure, the experimental driller towards the finding of oil or gas may hereafter realize the advantages of consulting a good geologist, as in other fields of that science, such as coal, iron ore and many other minerals, concerning which the geologist alone has any clear and positive knowledge. I remark, also, that the oil and gas of Russia, Canada, Texas, California, Pennsylvania, West Virginia and many other states and nations, are mostly found in different formations; so that we are not so free to deny the presence of oil or gas in those strata that have not yet proved productive and which, while not encouraging any expensive investigation, may, nevertheless, in a local way, contain oil or gas or both; such, for instance the Findlay district, in Ohio and Indiana, wherein the Lower Silurian Limestone formations supplied for a long season and may yet furnish gas and oil, much to the surprise of geologists; these limestone rocks being variously from 12,000 to 15,000 feet geologically beneath our Devonian rocks which supply most of the oil and gas in this State. Moreover, it appears that our oil and the oil from many of the states and countries is largely of vegetable origin, while a notable exception is found in one district at least in California, where the fact that the oil will nurture larvae seems to indicate the marine animal as its main source, while, of course, California has other fields producing oil similar to our own, but, as is the case with many other states, the California oil is inferior to ours in commercial value and various products.

It is well to bear in mind the facts herein stated, and realize that it is only by the gradual process of investigation, drilling and careful study that we acquire additional knowledge and discover new fields of oil and gas for our present benefit, and much yet to be disclosed for the well being of those that succeed us and whose names as well as our own have long been "written in the book of Creation."

MR. WELD: As Chairman of the Memorial Committee, I would like to meet Mr. Hutchison and Mr. Black in the ante-room immediately to prepare our report.

The CHAIRMAN: The next item on the program is the Report of the Pomologist, Gabriel Hiester, Harrisburg, Pa. Is Mr. Hiester present?

The SECRETARY: Mr. Hiester is President of the Horticultural Association that is meeting upstairs and he will be here shortly.

The CHAIRMAN: Is there any other gentleman present that is on the program for this morning?

The SECRETARY: Mr. Chairman, Dr. Frear, the Chemist of the Board, is not able to be present but has sent in his report. The report can be read or received without reading.

The CHAIRMAN: What is the pleasure of the Board in reference to this report?

MR. HUTCHISON: Mr. Chairman, I move the report be read by the Secretary.

The motion was seconded, put and agreed to.

The report of the Chemist was then read by the Secretary, as follows:

THE PEAT BEDS OF NORTHERN PENNSYLVANIA.

By DR. WM. FREAR, *Chemist*.

Mr. President and Gentlemen of the State Board of Agriculture:— Pennsylvania with her constant increase in population places upon the farmer the responsibility for providing a steadily increasing food supply, in which variety as well as quantity must be regarded as important factors. As far as conditions of production and transportation will allow, these supplies should be produced within our own borders. In view of the growing food demand, it is of great importance to the continued prosperity of the State as a whole that not only the methods of handling her present cultivated areas be improved, but also that the great areas within her borders that have not yet been brought under subjection and planted with food crops, be carefully studied to the end that they may be used for such purpose wherever their nature is such that they may be used for such purpose contribute to these supplies. The recent work by the State Experiment Station in co-operation with the United States Bureau of Soils in the study of the lands adaptable to the production of the apple and peach represents one promising effort of this kind. There are, however, numerous other promising subjects of study having the same end in view. Among these the development and use of the peat beds of the State are worthy of serious consideration and, judging from the growing number of applications made to the Experiment Station for analysis of these beds, public interest in them is growing.

There is unfortunately no survey of the State such as enables us to give at this time the total areas occupied by such deposits. In the various surveys of the State, these peat bed areas have been grouped with bottom lands in such a manner that the areas occupied by the latter and the peat beds respectively cannot be determined from the data published. It has been thoroughly estimated, however, that as a whole these beds cover not less than 75 square miles. All over the regions of the State covered by the glacial drift there are numerous lakelets filled from the drainage basins formed by surrounding steep hillsides, the entry of the water into the lakes often being by springs discharging upward into their bodies the sub-surface flow contributed by the higher land surrounding. These lakes have commonly been formed by dams of glacial drift deposited in the ravines of which the lakes form heads and the lakes discharge the excess of the water they receive through small streams flowing sluggishly over the tops of these dams.

Some of these lakes are shallow, because they were not deep to start with or because they have been filled with wash from the adjacent hillsides; others are still deep bodies of cold water. Be-

cause of the obstructions they alike possess both the shallow and deep lakes are marked, however, by only a slight current movement. Under these conditions many of them have gradually filled in with vegetation. The course of development of this vegetation consisted first in the formation of a growth of algae and related organisms over the water surface. The vegetable covering gradually thickened and presently came to support other growths, more especially those of the mosses. The weight of these later layers caused the undermost gradually to sink. This sinking often took place most rapidly near the shores of the lakes. As this succession of vegetation went on, the thickening layer of decomposing plants and the mineral wash from the surrounding uplands that is from time to time received in quantities varying very greatly according to the surroundings, in many cases, particularly of the shallower lakes, completely filled their depressions with a mass of vegetable matter; in other cases the vegetable layer became not only continuous but sufficiently coherent to support the weight of men and even of the larger domestic animals, although underneath the mass remained great depths of lake water. Through and under these vegetable formations the excess of lake water continues to seep slowly into the small streams that sluggishly work their way through the outlets earlier described. The character of the surface vegetation of these vegetable lands has changed from time to time, and today many support thick growth of flags, sedges, and bushes like that of the cranberry, but very rarely the heavier growths of trees. In a great many cases, the shores of the lake are fringed with bushes which have not, however, pushed out from the shores on to the bogs or peat beds just described.

These soils, together with those of swamp lands, are commonly classified as *cumulose* soils. In many particulars they differ from the other soil classes composed chiefly of mineral materials, their adaptation to crops is very much more limited than in the case of mineral lands, and the methods of their treatment also are peculiar. They have, however, marked fitness, under favoring conditions, for certain important crops, and contribute, moreover, raw materials of considerable value to a number of growing industries. In view of the increasing interest in the composition of these beds shown by the Station's correspondence, of the greater experience now available to guide their cultivation, and of the development of technical uses for their materials, I have thought it fitting to speak briefly upon some points relating to the preparation and cultivation of these cumulose soils and also concerning a few of their technical uses for certain of their products.

As a fundamental fact limiting and at the same time suggesting their adaptations, it should be recognized that these soils are formed almost entirely, or at all events chiefly, of vegetable matter which has decayed without the full access of air and that its raw materials have, for the most part, consisted of plants rather deficient in those mineral materials to deficiencies in which our ordinary field crops are particularly sensitive; and that furthermore, for a long period of time, these decaying plants have been leached by slowly trickling bodies of water so that such of their mineral materials as became soluble during the decay, were likely to be removed by the leaching process. Because of the small degree in which air had access to them during their decay, these vegetable masses suffered a putrefactive

decomposition, rather than that gentle oxidation most favorable to the conversion of plant remains into food suitable for succeeding plant organisms. The putrefactive conditions have gone on very slowly and while they have resulted in the loss of carbonaceous materials and also of some nitrogen, they have left residues rich in the latter element. Owing to the exclusion of air, the mineral materials of the decaying plants have been reduced rather than oxidized. The iron they contain, often in considerable quantities, has been either largely removed from them to lower strata, or has been held in the form of iron pyrites. The organic matters which remain are largely acid in their character, and, while little is known of the individual substances forming the organic complex in these soils, experience has amply proven that they are not in condition to favor the growth of ordinary crops, but rather to injure plants of such species.

As a rule the upper layers of these cumulose soils are dark, sometimes almost black in color, while the lower layers, less freely exposed to the air, are brown in tint. The upper layers are often covered by mossy growths, commonly those of the *Sphagnum* species, but the main body of the mass exhibits only faint traces of the organisms from which it was derived, except in the case of occasional large woody roots which found their way among the other vegetation. In some cases the material is of a dry, semi-resinous, or pitch-like consistence.

From the agricultural point of view the most interesting quality of these soils is their richness in nitrogen. This element is not present, it is true, in such condition that it is ready without important changes to contribute to the nourishment of ordinary crops; but the changes which must be brought about are such as can in many cases be quite readily accomplished. In lime, phosphoric acid, and potash, particularly the latter, the cumulose soils are particularly deficient, and it is, therefore, a condition to their successful use for agricultural purposes that liberate quantities of these less expensive fertilizer materials be supplied. In a few instances, considerable quantities of calcareous matter have been contributed to the cumulose beds in the wash from the neighboring hillsides; but the latter themselves throughout the glacial regions are not marked by any special abundance of lime compounds. For this reason, the wash, even when it forms a very considerable fraction of the cumulose soil, rarely contains enough soluble lime to change materially the character of these soils so far as concerns the supply of lime necessary for their conversion into productive lands. It is, as I have said, to their nitrogen that their agricultural value is due. This element, present to the extent of but .05 per cent. in heavy clay subsoils, averaging about .15 per cent. in good arable lands, and rarely exceeding .25 per cent. in old meadows, amounts above 1 per cent. in these cumulose soils and sometimes reaches two to three times that amount or even more. Studies made at the Station of the conditions in which this nitrogen exists, show that the various beds so far examined differ quite materially in their proportions of what is termed active humus; that is, of organic material capable of solution in dilute alkali. In ordinary lands where the active humus is abundant it is believed that the plant remains constituting the humus are in the highest degree available for the support of succeeding crops. In the cumulose soils most of the organic material is inactive, so that the nitrogen is especially resistant to the natural processes tending to make their

nitrogen available. In other cases, however, the proportion of active humus is quite considerable, and included therein may be found an important fraction of the nitrogen content of these soils.

Several points concerning certain of the physical properties in which the cumulose soils differ especially from the soils of other classes, may be noted in this connection. Respecting their heat relations, it should be observed that the soil temperatures are governed by the comparatively large amounts of water these soils contain, both when in their normal state and when best prepared for cropping. Schübler showed that, doubtless owing to their dark color as the principal influential property, garden mould and humus soils attain, when dry, higher temperatures upon exposure to the sun than do other soils. This is because it takes less heat to raise the temperature of humus than it does to increase those of clays, sand, etc. For Ulrich has shown that the quantity of heat required to increase by one degree the temperature of dry humus is about one-half that necessary to cause a like elevation of temperature in equal weights of clay, chalk, or sand. The power of these organic soils to transmit or conduct heat from one point to another is also much less than that possessed by the principal substances in mineral soils, as has long been known and recently very carefully proven by Patten.* All these data refer, however, to dry cumulose soils, and are of greater scientific than practical value because, by reason both of the location of these soils, their relation of bodies of water, their usually low lying position with respect to surrounding lands, and also because of their water requirements under cultivation, the cumulose soils are, in practice, dealt with only in the moist condition. As a matter of fact, these soils are cold, thaw out late, have a very short growing season, and are especially subject to late spring and early fall frosts; their common location near the foot of steep hillsides, renders them particularly open to the influence on quiet nights of cold air drainage, which intensifies conditions otherwise favorable to frosts.

The water relations of these soils are especially important. They have, in the first place, a very large water-holding capacity; that is, power to hold water without dripping. Those layers which are open and spongy, particularly those composed chiefly of mosses little decomposed, have an especially high water capacity amounting in some instances to upwards of six times the weight of the soil, or four-fifths of its dry volume. As the organic materials break down, however, they become less spongy, with a corresponding decrease in their water capacity, which nevertheless amounts in many cases from one hundred and thirty to one hundred and sixty parts by weight of the soil or from fifty-five to sixty-seven parts by volume. Their resistance also to the passage of water from one point to another in either a horizontal or a vertical direction, differed with the degree to which they have been decomposed, the movement being much more free and rapid in the more porous, little decomposed soil. When the compact, decomposed cumulose soil is broken up by cultivation instruments, its capillarity, that is its power to lift water through its pores, is distinctly increased. Another fact of special importance is that, once these soils are dry, they take up water very slowly, particularly when they are reduced to a fine dust, which is readily produced by the too frequent treatment of the surface of these soils with fine cultivating tools. Because of the slowness with which they recover from a

*Harrison E. Patten. Heat Transference in Soil. Bull. 59. Bureau of Soils, U. S. D. A.

drought and of the fact that they give up their water with considerable reluctance to growing plants, it is particularly important that the cultivation and management of the water relations in these soils be very carefully and systematically controlled.

Another of their physical properties requires mention because of its vital importance in limiting the range of production of these soils,—that is that they exhibit a very great change in volume as they dry or become wet and especially as they freeze and thaw. As a result biennial plants or others that occupy land through the winter are especially likely to be heaved out; hence, these lands are not usually suitable for the production of winter grain crops or for legumes having more than a single period of growth.

To prepare these soils for cropping, it is necessary to get out the excess of moisture, to admit the air with its warming and oxidizing power, to free the soil from substances injurious to crops, and to apply such amendments as will promote the availability of the nitrogen held in an inert condition by these soils and to add such fertilizing substances as they lack.

The cost of preparation of these lands by drainage and by the application of amendments and fertilizers is too great, in most instances, to render economical the use of these lands for crops that are now produced by extensive methods of farming. Where, however, the transportation facilities, nearness to market, and labor conditions make possible the growing intensively of onions or celery, it is well worth while considering whether or not the peat beds in such localities have drainage relations as will make their drainage possible without a too great expenditure, so that they may be fitted for the production of these crops.

It is not my purpose in this brief paper to describe fully the several methods which have been found useful in preparing such lands for cultivation. Several of the more important principles which govern will, however, be suggested. The first step is drainage and the method most generally followed as to drain by ditching with or without the use of a subordinate system of tile drains. The water relations of these soils suggest and the extensive experience of German farmers in the management of the moor lands which form so important a portion of the area of northern Germany, have proven that the drainage of cumbiose soils require plans different from those required in the case of mineral soils. In general, the water-table should not be more than twenty to twenty-eight inches below the surface and, where tile drains are used, the lateral ditches may be spaced so as to have an interval of sixty or ninety feet; and it is particularly important that the ditches be provided with dams, so that the drainage water may be dammed back to make it possible to hold the water in the soil during dry seasons. Irrigation systems also have been found especially advantageous for these lands in such seasons. Many of the peat beds of Pennsylvania are so situated that their drainage can be accomplished quite simply. There are others however, whose water level is determined by that of a large open body of water near whose outlet the peat bed is located. In the latter case they do not promise convenient control of the water relations, except where the peat beds lie at a level considerably above that of the lake.

As the water is drained away, the air enters these lands and begins very promptly their improvement by its oxidation process. A year

or more is, however, often required to promote sufficiently the conversion of these soils by oxidation to fit them for cropping.

The process of oxidation is not in all cases productive of entirely beneficial changes in the land. This is particularly the case where the latter contains, in considerable quantities, iron pyrites, bisulphate of iron, for when pyrites are brought into contact with air, they oxidize and form sulphuric acid and oxyhydrates of iron. In lands still holding sulphuric acid, it works marked injury to crops started upon the soil and the removal of this acid by drainage is very slow. It will be recalled that these lands hold relatively small amounts of mineral matter such as might combine with the sulphuric acid to form harmless compounds.

The general method of remedying this defect is the addition of lime or of carbonate of lime. The range of recorded experience in the application of lime to these soils is too small to warrant the formulation of any rules as to the quantities in which they should be applied; in general, however, the dressings are relatively abundant. The lime not only neutralizes the sulphuric acid and decomposes any sulphate present in harmful compounds, but, also like the air, changes the character and proportions of the lower organisms living in these soils and working over their materials. Some cultivators have found that the ashes left by the burning of the weeds and other waste growths upon the surface of the land, yielded sufficient alkaline material to make possible the growing of satisfactory crops on peat beds without the use of lime or of similar alkaline amendment during the first year. In such cases, the burning was conducted in the early spring while the soil was sufficiently wet to prevent the fire from extending downward into the peat bed and thus destroying it and liberating a large amount of available nitrogen.

It has already been pointed out that the plants from whose decay these peat beds are formed, are usually poor in phosphoric acid and potash, particularly the latter. It is readily understood, therefore, that those who have attempted to crop these cumulose soils after treating them with lime alone have often obtained unsatisfactory yields. Economic returns should not be expected, except where liberal dressings of rock and potash, rich in the latter element, are employed. The fertilizers need not, however, be expensive in proportion to their concentration in plant food for the reason that nitrogen, by far the most expensive plant food, is little if at all required on these lands.

No attempt will be made to describe in this place the detailed methods useful in the culture of onions and celery upon these lands. Various experiment stations have published numerous bulletins treating more or less directly upon these subjects and those interested will do well to obtain the Farmers' Bulletins and other publications treating of them.

There is another way in which muck is made useful on a farm which deserves brief consideration at this point. It has already been noted that the upper, looser layers of the peat are very spongy and can, therefore, hold larger quantities of liquid without dripping, and it has been pointed out also that they contain important amounts of nitrogen which though not available in their original state, can, if the proper fermentations be set up, be converted into plant food. These qualities have led many farmers to expend the labor necessary

to dig out piles of the muck allow them to stand where they can drain and undergo the changes brought through the winter's freezing and the summer's heating, and have then applied the material as a top dressing or as a material to be mixed with the soil. The results of these operations have not indicated that the treatments of drainage, freezing, and oxidation have been sufficiently effective to make the bed thus prepared a highly useful soil constituent. When, however, this porous material is put into the drops of a stable, or partly mixed with the rotting manure heap in the barnyard, it becomes impregnated with the stable or barnyard liquor and sets up a much more rapid fermentation. I am unable to recite chemical evidences showing the substances into which the nitrogenous materials of the peat are changed by the fermentations set up under these conditions, nor to give the results of exact vegetation experiments with the fermented materials, but the general judgment is that after such fermentation the peat contributes a very considerable proportion of nitrogen to the plant food supply of the soil upon which it is used as a dressing. It is, however, of great value as a bedding material. The sphagnum moss gathered by cheap labor in German swamps and imported into our seaboard cities under the name of "German moss," has been quite largely used for bedding horses in city stables. It shows a very large capacity to absorb stable liquor, does not undergo disagreeable fermentations, and has considerable durability. It does not, however, keep the animals in so clean a condition as good rye or wheat straw. Certain of its constituents seem to retard the ammoniacal fermentation. On the other hand, more highly decomposed muck turns, when used in the drops, into a heavy black mud, hard to handle, and not most conducive to stable cleanliness. In my introductory words I referred to the fact that these peat bed materials are coming to increasing technical use. At the present writing, it is possible to make only a brief reference to some of these uses. The moss, picked and dried, is being employed as a packing material in the place of excelsior, as a filler for mattresses, and also as a raw material for paper manufacture. Another use to which the more compact materials of peat beds are being put is that of a fuel. It is well known that, for centuries, the Irish peasant has warmed his cottage by use of the heavy turf or *sods* of peat cut from some nearby bog. The present experiments have the object of putting this fuel into more compact, convenient, and durable form for transport and consumption, and very interesting results have been obtained by the making of briquettes of peat, with or without the use of combustible bindings. Most of the acetic acid used in chemical manufacturing operations is now produced by the distillation of wood whose chief constituent is cellulose. Distillation methods have also been applied to peat with more or less promising results.

The last of these technical uses to which I would now refer is the use of dry peat in the manufacture of commercial fertilizers. For this purpose thoroughly decomposed peat is used. It is prepared by drainage, drying, and granulation by a milling process. Thus prepared it contains in some cases as much as 3 per cent. of nitrogen. Its use in fertilizers might, in view of the fact that the nitrogen as it is in peat is practically useless to plants, be regarded as undoubtedly fraudulent in so far as the nitrogen contained in the peat enters into the sum total which the fertilizer guaranty requires

shall be present in the mixed fertilizer. In other words, the case is not simply that of an inert filler having no fertilizer constituents which would appear upon the usual methods of analysis and which is employed solely as a make-weight in the manufacture of low grade fertilizers. The fertilizer manufacturers claim, however, that the use of this or some other organic material in the base goods from which the various fertilizer mixtures are made by the addition of one or more of the fertilizer salts is desirable, because it serves as a "conditioner," that is, a material which keeps the goods in excellent drilling condition even when they have been exposed in storage to extremes of dampness or dryness; whereas, without some such material the fertilizer tends either to become moist if stored in damp places, or to dry and harden into lumps if stored in places too dry. No farmer who has applied fertilizer by means of a drill or by means of a broadcaster, will question the importance of a good physical condition in a fertilizer, but I am confident that, on the other hand, he will not be satisfied to pay for peat nitrogen at nitrate, ammonia, or tankage nitrogen prices, unless he be satisfied that a good physical condition cannot be secured at a less price. It has certainly not been demonstrated that the use of this material is necessary to the maintenance of a good drilling condition in a fertilizer. There are unfortunately no data available whereby the quantity of nitrogen contributed by peat and similar materials can be ascertained from the examination of a finished fertilizer. Indeed, there is yet lacking an entirely satisfactory test of its presence in any quantity. In the existing condition of knowledge we may, however, gain some slight satisfaction from the facts that peat is commonly introduced into fertilizer base by the wet mixing process and that, as Professor Haskins, of the Massachusetts Experiment Station has shown, peat nitrogen after exposure to the heat and acid of the wet mixing process becomes more highly soluble and has shown itself by vegetation tests conducted in wire baskets in a very considerable measure more available to plants than when in its original raw state. The Pennsylvania Agricultural Experiment Station is at the present, under the writer's direction, conducting tests upon the effect of wet mixing on inert nitrogenous substances, including peat, with the hope of adding to our present knowledge upon this subject.

The CHAIRMAN: You have heard the Report of the Chemist. What action will the Board take on it?

MR. GLOVER: I move the report be received and published in the journal of the proceedings of the Board.

The motion was seconded, put and agreed to.

The CHAIRMAN: Is there any other gentleman present that is on the program for this morning?

Has any Committee a report to make?

The SECRETARY: Mr. Chairman, in the absence of any more of the Specialists of the Board, I think perhaps we had better take up the last item on the program, the discussion of Tile Drainage by

T. E. Martin. Mr. Martin asked me to secure for him a blackboard that has not arrived so far as I am able to see. Is Mr. Martin present? He does not appear to be at this time.

The CHAIRMAN: Is there any other gentleman present that has anything to say to fill in until he arrives? We don't want to have a Quaker meeting.

MR. RICHARD ATWATER: Mr. Chairman, I am not a member, but may I speak a moment?

The CHAIRMAN: Certainly, sir.

MR. ATWATER: The principal matter that brought me to this meeting was to look into the use of basic slag. Our lands in the southeastern part of the State need phosphorus and I have no doubt they do all over the State. In the last few years the process of making steel in Pennsylvania has changed, as you probably all know, from the Bessemer process to the open hearth process or the basic process by which the phosphorus in the iron ore is eliminated by mixing with lime and gas and carried out in the slag as phosphate of lime. We are paying high prices for phosphoric rocks from different parts of the South, Florida and South Carolina and importing basic slag from Europe made by the steel process as improved there. I would like to know whether any use is being made of the phosphoric acid drawn out of the open hearth furnaces at Harrisburg and Bethlehem and Lebanon and other places. It seems to me that it is one of the most important sources of fertilizer for the farmers of Pennsylvania that I know of.

I hoped to find Dr. Frear here this morning as I think he will be able to tell me what I want to learn.

MR. BRONG: Mr. Chairman, basic slag is a material, as the gentleman stated, derived from iron. The phosphoric acid that it contains is not water soluble to any great extent. It is, however, available as plant food in the soil. We have used it for eight or ten years. We find it profitable. We can buy it cheaper than we can buy acid phosphate. We believe that acid phosphate used continually has a tendency to discourage the growth of clover by souring the soil, and therefore we prefer very much the use of this material. We use it almost exclusively on our farm.

MR. ATWATER: That is what I hear from the people. I speak on the basis of buying imported basic slag. You get your lime free, about thirty-five to forty per cent. in it, and that is all the advantage you have. But here we have it at our doors without bringing across the waters.

A Member: I would like to ask the price of acid phosphate in Baltimore last year.

A Member: It was, I think, ten dollars for fourteen per cent. It came to the other end of Crawford county at much less, well about thirteen dollars and fifty-five cents for a ton of sixteen per cent. My idea was that the unit of percentage of phosphoric acid in basic slag would come much higher than that, if you have the per cent. and proportion of phosphoric acid.

MR. BRONG: The acid phosphate costs at retail—of course, I do not buy it at retail—but at retail the acid phosphate costs about one dollar a per cent.; that is, fourteen dollars for fourteen per cent. phosphorus; and basic slag, also at retail—I don't buy it at retail—we can buy for eighteen dollars a ton. The basic slag contains over nineteen per cent. phosphatic acid.

A Member: Practically the same price.

MR. BRONG: They consider this per cent. of acid the unit. You pay the price per cent.

MR. ATWATER: The advantage at the present time in buying imported is that you get your lime free.

The CHAIRMAN: The next will be the Report of the Sanitarian of the Board, Dr. W. H. Banks, Mifflintown, Pa. Is Dr. Banks here? He does not appear to be present so we will go on with the next item. The next item on the program is the Report of the Microscopist and Hygienist, Prof. J. W. Kellogg, Harrisburg, Pa.

Prof. Kellogg then read his report as follows:

REPORT OF THE MICROSCOPIST AND HYGIENIST

By PROF. JAMES W. KELLOGG.

A report of the work accomplished during the year must necessarily be confined more to microscopical examinations than to that which might possibly be designated to the duties of a hygienist, or the work which has to do with sanitary science and the preservation of health. Your specialist has only been able to devote study to microscopical work in connection with the examination of feeding stuffs made by the Bureau of Chemistry of the Department of Agriculture, whose duty it is to examine these commodities for their purity of composition. During the past year, we have been busily engaged in this line of work and are able to report that the samples examined were found to be as a whole greatly improved over those examined during the previous year.

The use of the microscope in investigations of this kind and in studying nature is one of the most interesting branches of science. The value of this instrument cannot be estimated, and the discoveries made by its use are too numerous and too wonderful to endeavor to describe here. The microscope has helped men of science to unlock the secret of nature, to look into another world, the microscopical world so to speak, and to discover new forms of life and small particles of matter which were never dreamed of before this valuable instrument was perfected and as widely used as it is today. All through the centuries men have unlocked nature's secrets one after another, first, by a very crude instrument and later by improved

forms, until at the present time, the microscope is used in practically all branches of scientific research, and in the business of the commercial world.

It was known by the Greek and Roman Philosophers before the time of Christ, that globes of crystal or lenses would focus the sun's rays to a single point. Seneca states that "letters though small and indistinct are seen enlarged and more distinct through a globe of glass filled with water." The ancient students, however, do not appear to have made use of this phenomenon as an aid to vision, as in the thirteenth century, medical writers seemed to be of the opinion that it was impossible to cure short-sightedness.

The first distinct advances in microscopy were made by the Arabian physician, Athazen, in the eleventh century. Near the end of the thirteenth century, we learn that lenses were first used as a help to defective vision, for we are told that Salvino Armati, a Florentine, first invented spectacles. At about the end of the sixteenth century, lenses were used as microscopes for the examination of objects too minute to be studied with the unaided eye. These lenses were, of course, very crude affairs and were only used singly. The microscopes which are in use today are known as compound microscopes and are made up of several lenses capable of magnifying an object several hundred times. The first instrument of this kind was invented about 1590, and Galileo perfected one in 1610. Since this period, every year has seen new improvements, and no up-to-date and well equipped laboratory is complete without a microscope. It has only been in recent years that this instrument has been made use of in the analysis of foods and feeding stuffs, and Pennsylvania was one of the first states to take up this line of investigation.

When the inspection of feeding stuffs was first commenced in our State, it would have been impossible to learn the true character of these products, if microscopical work had not been done. The analysis of a feeding stuff is of course of great importance, but it is also important that the source of protein, fat and carbohydrates are found, and by a thorough examination of the feeding stuffs, we are able to determine the source and nature of the ingredients. It would seem to those unacquainted with the work that it would be difficult to determine the composition of a mixed feed which has been compounded of several ingredients, covered with molasses, dried and finely ground, but with the aid of a microscope, we are able to magnify each little particle or tissue in any feed to 400 times its actual size if necessary, and as occasion demands, and to tell just what cereal or by-products are used in the mixture.

Every cereal has a peculiar cell structure different from that of other cereals, and the starches of the many grains differ in their size and shape, and it is as easy for an expert to learn to know these different grades of wheat. There are twenty different kinds of starches which are in this way easily identified by the size and form of their grains.

The structure of the cell walls of a kernel of wheat grown this year would be the same as that of one grown in Egypt two thousand years ago, and can be easily distinguished from the cell structure of rye, barely or oats. This may be illustrated by the fact that the side walls of the cell in the seed coat of a kernel of wheat looks under the microscope like a string of beads, while those found in the

barely are smooth edged and sinuous, and the cell walls of other cereals are different from these. The starches of the wheat are round and flat, while those of the potato are three or four times as large and shaped like an oyster shell. The structure of the cell walls of the corn cob, rice hulls, peanut shucks and the weed seeds are very characteristic and markedly different from each other when magnified about four hundred times, and are easily identified by the practiced eye.

A few years ago, a large number of feeding stuffs were sold in Pennsylvania which contained rice hulls in a finely ground condition, ranging from ten to twenty-five per cent. Other by-products were used which caused the protein and fat to meet the guarantees, but, by the aid of the microscope this form of adulteration was detected, and as a result during the year just closed, this material was not found to be present in any feeding stuffs sold in our State. By our thus being able to tell of just what the products are composed which are offered for sale as a food for our citizens, or as a feed for their stock, we are able to prevent fraud and deception and to keep down the sale of such articles which are not worthy of being produced or sold.

The stalks, tissues and fibers of plants, the cell structure of woods and barks, hair, wool, fruits and their seeds and hundreds of other products of the vegetable and animal world have special characteristics of structure known to the trained microscopist. By reason, therefore, of his special knowledge, he is called upon to tell whether or not a product sold as wheat middlings contains 26 per cent. of ground corn cobs, if the pepper which he is using contains vegetable ivory, cocoa shells or some inferior bean, and whether or not the many spices are as pure as advertised. He is asked to tell us the composition of paper and to state the proportion of linen rag or wood pulp used therein. By a knowledge of the structure of the vegetable and animal fibers, the composition of fabrics can readily be told. Thus, it will be seen that the microscopical investigations which have been made and which are continually going on are of great value, and this work in conjunction with chemical analysis has made it possible to keep the food products sold in our Commonwealth up to a high standard.

The work of a hygienist should be devoted to that branch of sanitary science which has to do with the keeping of the communities in which we live in a sanitary and healthful condition. Work of this nature covers a wide range of subjects, and it is unnecessary to state its value. For several years large and small cities have devoted a great deal of time and money to this line of work, and the work done by our present State Department of Health is well known throughout the land. When investigations are made as to the sanitary conditions of some places of abode, it is almost amazing to learn how little attention is paid to this work. Laws have been passed in nearly all the states of our country, regulating the sale of food products. In many of our cities we have milk inspection and of course food inspection, but very few cities or communities have what might be called sanitary inspection, which, to my mind, is as important and possibly more important than the analysis or examination of foods. This might be illustrated by conditions which can in many instances be verified by visiting a restaurant to obtain

a meal. The food served there might be of the best quality and may have been in a cleanly condition, but, on the other hand, it often happens that the sanitary conditions of the kitchen and those serving us are such that would make the spread of disease or sickness possible. I personally have been an observer of these conditions, possibly noticing them more than some, by reason of being very much interested in this line of work.

I have visited cafes, restaurants and places where food is sold and have noticed that the sanitary conditions and the methods of handling food were not as they should be. Many illustrations might be given but these conditions are too well known to the careful observer to bear repetition here.

The State of North Dakota enacted a law of 1909, known as the Sanitary Inspection Law, which, it seems to me, is one of the most important laws which has to do with the preserving of the public health which has been passed for some time in any state. This act provides for the sanitation of bakeries, canneries, packing houses, slaughter houses, dairies, creameries, and every place and vehicle in which food for men is placed for transportation or sold. It also provides for the proper and cleanly condition of any dispensary, hotel or eating house where food is sold. It makes it possible for officers in enforcing this law to visit all such places and see that the plumbing and drainage are proper and that the places are kept clean, properly lighted, etc. It also provides for protection from flies, dust and dirt, and that operatives, employes, clerks and any persons who handle foods in any way, shall be cleanly, and to be free from any disease, a number of which are enumerated.

I have been told by the official who has this law in charge that it has worked remarkably well and has been the result of causing several ice cream dispensaries and small restaurants to practically close down until the sanitary conditions were such as to warrant patronage. The Health Department of our State would of course control this matter to some extent, but I thoroughly believe we should have a strictly sanitary law which would correct these evils and prevent such unsanitary conditions as are too often observed in places where food for human consumption is offered for sale.

The CHAIRMAN: You have heard the report? What action will you take upon it?

MR. GLOVER: Mr. Chairman, I move the report be received and published in the journal of our proceedings.

The motion was seconded, put and agreed to.

The SECRETARY: Mr. Chairman, the Poomologist of the Board, Mr. Hiester, has sent his report down with the statement that he is kept so busy in the room above that probably he will not be able to be here. Now this report is at the disposition of the Board. It can be read or it can be received without being read.

The CHAIRMAN: What is the pleasure of the Board?

The SECRETARY: Mr. Martin does not seem to be in and possibly it may be as well to have this report read so that we will have something to be thinking about.

MR. ESCHBACH: I move, Mr. Chairman, that the report be read.

The motion was seconded, put and agreed to.

The CHAIRMAN: By whom is it to be read?

The SECRETARY: It is a pen written report. I will try to read it.

The CHAIRMAN: The Secretary will read the report.

The report of the Pomologist was then read by the Secretary as follows:

REPORT OF THE POMOLOGIST

By GABRIEL HIESTER, *Harrisburg, Pa.*

We are at last making some progress in the science of growing fruit. The orchard experiments that have been running four years under the supervision of Prof. Stewart of the State Experiment Station are beginning to show results. For instance, it has been found that nitrogen applied in the form of nitrate of soda after the fruit has formed, in June, increases the size of the fruit, as well as the growth of the tree, but at the same time it reduces the color of red apples. This loss of color in Prof. Stewart's opinion is caused by delayed ripening. Again, it has been found by practical fruit growers that fungicidal sprays applied under proper weather conditions will cause the foliage to remain fresh and green until nipped by the frost, and when the leaves are kept in a healthy condition late in the fall fruit is delayed in ripening. This may mean a great deal to the orchardists of southern Pennsylvania, especially to the region known as the York Imperial belt, namely, that section of the Blue Ridge extending from the Maryland line to the upper end of Dauphin county.

The Baldwin apple is generally recognized as the best business apple; it is the standard by which other varieties are measured—as to vigor of tree and hardiness, quality of fruit and the price it will bring in the general market. There are large areas of ideal Baldwin soil in this York Imperial belt, and many thousand Baldwin trees of bearing age. The variety, however, has one serious defect, owing to climatic conditions the fruit drops early in the fall, and those remaining on the trees do not keep well. For this reason several less desirable kinds, which will hang on the tree are being recommended for planting in this district.

If, by the judicious use of nitrogen as a fertilizer and Bordeaux or some other fungicide as a summer spray, we can hold the fruit of this desirable variety on the tree until the first week of October, the Baldwin trees already growing in the orchards will be made profitable. More Baldwin trees will be planted and King and Spy will be added to the list—for with very slight variation of soil conditions the two latter will succeed wherever Baldwin does. We know that York Imperial, Grimes' Golden and Staymans' Winesap develop

their highest qualities in this region. If we can add Baldwin, Spy and King we will have six splendid varieties to select from. It seems to me the York Imperial belt should very soon develop into the most famous apple orchard in the world.

If the future observations of Prof. Stewart shall confirm the impression already formed, namely, that nitrogen properly applied as a fertilizer will delay the ripening of apples, and if that with the aid of a proper fungicide as a summer spray, will keep them on the tree in southern Pennsylvania until mid October, by which time the sun will have painted them the proper color, this one discovery will be worth a hundredfold more than the entire cost of the experiment.

Another fact has been brought out by these experiments: In the older orchards, especially those which had not in recent years been well cared for, nearly all the feeding roots were found to be outside the spread of the branches. Many of them extending forty feet and more from the trunk. It will be well for the owners of old orchards to bear this in mind and in their efforts to bring the trees back to profitable bearing, place their fertilizers where they will do the most good. When placed near the trunk they are of very little value, when placed under the outside branches they are partially available, but when scattered between the rows outside the branches the trees get the full benefit of them.

In my last report I expressed a hope that in the near future we might have an investigation started to ascertain the effect of different types of soil and subsoil on the several varieties of fruit, for the purpose of enabling us to plant the right tree in the right place. I am glad to be able to announce that in response to the urgent request of Dr. Hunt, Director of our Experiment Station, the Department at Washington detailed Mr. H. J. Wilder of the Bureau of Soils to work in Pennsylvania. The Department loaned Mr. Wilder to our Experiment Station for one year, and he has been at work in this State all summer. Mr. Wilder has made a good start. He secured and tabulated much useful information; he has done well for the time spent, but his work is only begun. Our people are only beginning to appreciate the value of it, therefore it seems to me that it would be a calamity to have this work stopped at the close of the year.

I would suggest that at the proper time this Board pass a strong resolution urging the Department at Washington to continue his leave of absence, and another asking our Experiment Station to continue this work, and also to continue the orchard experiments so ably conducted by Prof. Stewart; in both of these lines we have made a decided advance.

Experiments with various fungicides and insecticides as summer sprays have been conducted by Prof. Stewart at our Experiment Station; by our Economic Zoologist; by the National Department at Washington and by the Experiment Stations of the several states. Nothing has yet been found that is in all respects and under all conditions better than Bordeaux and an Arsenate. It seems that under certain weather conditions they will all do more or less injury. It is up to our scientific men now to tell us under what weather conditions we should not spray with anything, and under what weather conditions we may use the several sprays which they have found effective.

The use of self-boiled lime-sulphur for the control of brown rot in the peach is gaining in popularity, and we hope that before another year has passed, we may have a formula for making it that will be certain in its effect on the fungus, and at the same time do no injury to the foliage.

The most hopeful sign of the times is the interest the young men are taking in horticulture as is shown by the number of students in the regular four years course in horticulture at State College, in the two years course and in the twelve weeks course, and the young farmers who attend the lectures on horticulture during farmers' week. These young men are not only learning how to grow fruit, they are carefully studying the art of grading and packing, and already are sending to the general market box apples and barrel apples, which for skillful, honest work will compare favorably with those from the famous orchards of the west. These young men are doing much toward establishing a reputation for Pennsylvania fruit. We all recognize the fact that the greatest need of the fruit industry in Pennsylvania is men properly trained for the work, and this need is being gradually supplied, with a number of Horticultural graduates going out from State College each year and hundreds of working farmers going to the college each year for a week's lecture course, with the Farmers' Institute bringing lecturers to their very doors, to tell them why they should do certain things, and the demonstrators of the State Department following up the institute to show them how to do it, the men are rapidly being trained for the work, and we are developing a class of fruit men in Pennsylvania equal to any that can be found in the most progressive fruit district of the country.

The CHAIRMAN: You have heard the report. What action will you take in regard to it?

MR. HUTCHISON: Mr. Chairman, I move the report be received and published in the journal of our proceedings.

MR. KERRICK: Mr. Chairman, I would request the Committee on Resolutions, Messrs. J. A. Herr, Shaffer, Perham and Shoemaker, to meet with me in the anteroom immediately.

MR. HUTCHISON: Mr. Chairman, before that committee retires I move that that portion of Mr. Heister's report which relates to the passing of these two resolutions in regard to having Mr. Wilder, now detailed by the Department at Washington and who is now doing such excellent work at State College, continue his work; also that portion of the report regarding the continuation of the experiments by Prof. Stewart; that that be referred to the committee for action and the preparation of the resolutions as suggested.

The motion was seconded, put and agreed to.

The CHAIRMAN: Is the Memorial Committee ready to report?

MR. WELD: We are, Mr. Chairman.

The report of the Memorial Committee was then presented by the Chairman, Mr. Weld, as follows:

REPORT OF THE MEMORIAL COMMITTEE

It is with a sense of sincere regret that your Committee at this time record the death of our fellow member and co-worker from Montgomery county, Honorable Jason Sexton, and while we know that he has passed to a better and brighter land, our hearts are filled with sorrow as we note the absence from our meetings of one who had been so active in the deliberations of our Board and whose advice and counsel was so helpful to our membership.

Therefore, be it resolved, by this Board, that a copy of this Resolution be spread upon the minutes of this meeting and that we extend to our brother's family and friends our sincere sympathy in their sad affliction.

R. J. WELD, Chairman.
W. C. BLACK,
G. G. HUTCHISON.

The SECRETARY: Mr. Chairman, I move the adoption of the Report of the Committee on Resolutions.

MR. HUTCHISON: Mr. Chairman, I second the motion.

The CHAIRMAN: Are there any remarks?

The SECRETARY: Mr. Chairman, it is always with mingled feelings of joy and sadness that we consider reports of this kind. Reference was made in the report to the fact that we believe that our good friend, who has been attending with us in the work in which we are engaged, has gone to a higher and brighter life and that, of course, ought to be a source of rejoicing to know that a redeemed soul has entered into that life that has no night and that is everlasting. And yet Mr. Sexton was so near to many of us by association, was so highly esteemed by us, that we miss him; we miss him not only here but in the ordinary private walk of life.

I have known Mr. Sexton for a number of years. He was a member of the House of Representatives during a part of the time I served in the Senate. I always found him to be a courteous and affable gentleman, a gentleman in his instincts and manner. He was not only a gentleman, but a Christian gentleman. In every act of his life you can see his conscientious record for that which he considered to be right. As a member of this Board he was active; always at his place of duty, ready to meet any call made upon him; and as I stand here today I want the fact recorded that I personally miss Mr. Jason Sexton in the work of the Department.

I did not wish to make any extended remarks, but I felt, Mr. Chairman, like saying this much before this resolution should pass.

The CHAIRMAN: Any other gentleman have anything to say?

MR. JOEL HERR: There was no member of the Pennsylvania State Board of Agriculture nearer to me in my personal regard and personal friendship than what Jason Sexton was: A man of age,

ripe experience, high culture, agreeable personality. I want to mention one particular that the Secretary did not mention. While I agree with all that the Secretary said, and appreciate that he has said it better than I could, I want to allude to his spirit of patriotism: A most thoroughly loyal man, a member of the Grand Army, a man who served in a New York regiment during the entire Civil War, and who always had a good, warm side for the veteran, and he was taken away suddenly while making a patriotic address on Memorial Day; a sad thing to think of. He was just doing what he prided in, what he loved to do. He loved to talk with his old comrades and as comrades we very greatly miss him. I have been at his home. In his family he was a most honorable, pleasant man; and I say we will miss him. No member of the Board will be missed more than Jason Sexton. He has filled every position on the Board, and he never filled any position except with the greatest credit to himself and to the Board.

MR. HUTCHISON: Mr. Chairman, I wish to add a word on the life of Jason Sexton. I knew him from the time I met him first when he was serving in the House as a Representative from Montgomery county. I always found him true to the interests of his people, true to the interests of the farmer and a true man in all callings of life.

I knew him as a member of this Board, always courteous and brotherly, always kind and ready to do his part and do it well. I knew him as a true friend. I speak from personal experience. At a time when some controversies were going on, in which I was interested, before a large body of citizens of this Commonwealth, in which we differed in the matter, he was requested to take issues in that matter and to take sides against what I thought was right, and which was a personal matter to me, and he came and laid his hands on my shoulder and said: "George, I will not do it." That remained with me through life until this time, and I feel more today as though I lost a relative than losing one who is no blood kin to me in the death of Jason Sexton. There are few men who come up in life in this State or come from another state into this State that lived to make that life a truer life than he did. He always met us with a smile and a kind word and we men will miss him greatly in the work of this Board. I would say that I know and I feel that these resolutions express the truth when we say that he has gone to a place where he will forever and ever be happy.

The CHAIRMAN: My feelings compel me to pay a tribute of respect to Mr. Sexton. I knew him for long years and a good many members of the Board remember of the loved friend and neighbor. I always found him to be an upright, true Christian gentleman, and a man of great decision of character. He was one among the oldest members of this Board and always, as has been said, ready and willing to do his full part in anything that was assigned to him. I therefore want to endorse everything that has been said. Peace to his ashes.

DEPUTY SECRETARY MARTIN: Mr. Chairman: In the taking away of Mr. Sexton I have lost a warm personal friend; the Division of Farmers' Institutes has lost a wise, tactful and discreet

County Chairman of Institutes; a man who had within him powers of concentrating the forces in agriculture in his own county such as few men possess. He was a man loyal not only to his friends, but always loyal to the cause he espoused; loyal to his country; loyal to his God and loyal to the State. The State Board of Agriculture has lost a wise counsellor and friend and the Department of Agriculture has lost the same. We take comfort in the thought that he is marching along amongst the throngs on the other side.

MR. DURNALL: I felt deeply at the time the death of Jason Sexton and I have always thought and been enabled to say that it was manifest in him that "an honest man is the noblest work of God." He was a man that the world is better for him having been in it. He was a man of strong convictions and a man that was uncompromising in principle, a man who tenaciously upheld that which he believed to be right yet was always willing and always charitable to an opponent who had other convictions and was willing to concede to that opponent the right to sustain his convictions without any enmity or harsh feeling. I readily know that what Mr. Hutchison said was true, that where he thought he was in any way, by sustaining a position, likely to wrong an opponent, he refrained. This humility, this sinking of self was very strong in Jason Sexton, and it is a quality, a characteristic that it would be well for all of us to emulate.

MR. JOEL HERR: Mr. Chairman, I move the report be adopted by a rising vote.

The motion was seconded, put and agreed to.

The CHAIRMAN: We will now have the report of the Executive Committee if they are ready.

Dr. Conard then presented the Report of the Executive Committee as follows:

REPORT OF THE EXECUTIVE COMMITTEE

To the Members of the State Board of Agriculture of Pennsylvania:

Your Executive Committee beg to submit to you the following appointments and assignments: (See page 7.)

Respectfully submitted,
M. E. CONARD, Chairman.

The CHAIRMAN: You have heard the report of the Executive Committee. What action will you take upon it?

On motion the report was adopted as presented.

The CHAIRMAN: Is there any other report ready? It appears not. Is Mr. T. E. Martin present?

The SECRETARY: I will ask Mr. Hutchison to go upstairs and see if he is at that meeting.

MR. DURNALL: Mr. Chairman, if there is nothing before the meeting may I have a minute?

The CHAIRMAN: Yes, sir.

MR. DURNALL: I would like to call attention to the persons present to the remarks and the subject referred to by the Principal of the Perkiomen Academy yesterday afternoon before adjournment. It is a question that has deeply impressed itself upon my mind for several years of the necessity of getting the boy and the science of agriculture nearer together, and how best to do this was given to us yesterday as the ideas of that Principal. I would like you to take it home with you and give it more than passing thought, as to the education of the masses; to train the boys, to educate them *to* and not *from* the farm through the medium of our public schools and how they can best be reached through that medium. I have a plan worked out in a way, crude state, which I am going to have brought before the attention of our farmers' institutes in Delaware county next month, by papers from various practical men along that line. We have a system partially worked out. I do not know whether it will be made practical or not, but it is up to each one of us, it is our duty and here is our opportunity to prepare the rising generation. We have to take care of an increasing population that has almost increased itself twenty-fold within the last one hundred years in the United States, and we can readily see what we may reasonably expect within the next twenty-five years and that the boys and girls born today will have this labor on their shoulders. Therefore, I would say and I earnestly request you to carry this with you to your home, to your neighborhood and through whatever medium you can best reach the masses, do it.

The CHAIRMAN: We will now have the Report of the Committee on Legislation, Hon. H. G. McGowan, Chairman.

Mr. McGowan then presented the report of the Committee on Legislation as follows:

REPORT OF THE COMMITTEE ON LEGISLATION

We the Committee on Legislation beg to submit the following report and would respectfully recommend as follows:

1. That the real estate owners of Pennsylvania demand a just equalization of taxation in this State. We would reiterate that if personal and corporate property were taxed at the same average mill rate that real estate would be taxed, personal and corporate property would be required to pay forty-five million instead of twenty million. We further believe that a great help towards the equalization of taxation is found in the proposition of having the State pay the minimum salary of school teachers for the minimum school term. To correct discriminations that exist against the farm and farm owners of Pennsylvania, we respectfully insist that the State either assume a larger proportion of the cost of the local

government, or give the local governments authority to tax personal and corporate property in each unit of government. The local government of our State could be further relieved by appropriating a minimum sum per mile to counties and townships for road purposes equal to 100 per cent. of the cash road taxes paid each township. Let the State assume, with the aid of the National government, the entire construction of interstate and inter-county roads and maintain the same.

2. If we have not sufficient revenue for the advanced government of the State, an additional tax of one mill could be placed on all personal and corporate property with a small tax on the gross products of mines, oils and gas wells and similar enterprises. An increase license on automobiles would greatly assist in increased revenues, and such revenues received would greatly assist in increased revenues, and such revenues received should go specifically for road purposes.

3. We, your Legislative Committee, would suggest that some remedy be presented, or law enacted to regulate the improper use of public roads by teams and cutting them up and almost ruining our public roads through heavy hauling over them without paying any damages to townships, many times ruining the roads for miles. Permits should be taken out, through the Board of Supervisors, before using the roads for continuous heavy traffic. When a public road is almost entirely ruined, many times to the extent of several hundred dollars, some specific remedy should be prescribed by law.

4. We heartily endorse the Good Road Movement that seems to have taken a new lease of life in our State. We highly appreciate the generous efforts of the Pennsylvania Railroad Company in furnishing an educational train to traverse the State from east to west in the hope of bringing out a more determined effort to construct permanent roads all over our great State. We recommend the election of a County Engineer of Public roads, similar to that of a County Superintendent of Public Schools.

5. The purchase of the old toll roads of the State does not appeal to us as fair, inasmuch as many counties in the past have freed the toll roads and bridges at the expense of their own counties to the amount of many thousands of dollars.

6. We believe in the intelligent use of the King Drag for our public dirt roads. We would recommend a law compelling telephone companies to interchange messages.

7. We believe that our farmers are much interested in the passage of a law providing for a State Agricultural Fair. Too much cannot be done for agriculture, either by the appropriation of money or by the passage of new and effective laws.

8. We want a law compelling seed dealers to label seed bags either strictly pure, or as containing a percentage of inferior seeds. We are glad to say, however, that our worthy Secretary has now in course of preparation a bill fully covering this subject.

9. We recommend the Initiative and Referendum and Recall system as it is now practiced in Oregon.

10. We further recommend that an appropriation be made by the State to pay the deficiency to the different agricultural societies throughout the Commonwealth for premiums, in accordance with the provisions of a law which now allows each county in the State \$1,000 for premiums on agricultural exhibits.

11. For the furtherance and increased spread of Agriculture and Agricultural Literature, we favor the proceedings of the State Board of Agriculture to be placed in the various public schools throughout the various counties of the State.

12. We disapprove of a law which inflicts a license fee for hunting game throughout the State.

13. The State Livestock Breeders' Association are doing valuable work in extending and spreading the thorough breeding of animals, greatly improving the different breeds of livestock throughout the Commonwealth of Pennsylvania.

14. The good work of our State College is apparent to us all, however, it is inadequately equipped for the accomplishment of telling work. The Poultry Department of the College is without buildings and equipment for carrying into telling effect the proper development that should be, along this important branch of agriculture. We would most earnestly recommend to the present Legislature that sufficient appropriation be made for such buildings as is so much needed for the proper carrying out of modern methods along all lines of new agriculture at State College.

15. We join in hearty endorsement of the rapid development of our State Horticultural Society and compliment the society upon their magnificent display of fruit as seen in the Johnston Hall of this city.

16. We fully recognize the efficient work of the Department of Agriculture and come with words of praise for the improvement of the new law regulating the manufacture and sale of Commercial Fertilizers. We would, however, recommend a more simplified method of computing the value of a ton of fertilizer by omitting much of the wording placed upon the outside of the sacks of fertilizer.

17. We heartily endorse the sentiments expressed by Governor John K. Tener before this body yesterday, namely: That roads should connect county seats, and run perpendicular to and not parallel with our railroads. That the State should have some well devised system of road making, and that all revenues be used to relieve local taxation.

18. For the further stimulation of agriculture, which is the foundation of all our material wealth and prosperity, we would recommend that agricultural societies, instituted for the spreading and development of agriculture, owning their own properties and holding annual fairs, be exempt from the burdens of taxation, as this would greatly assist and relieve pecuniary obligations.

19. In conclusion, we would, to the best of our ability, impress upon the farmers of Pennsylvania the necessity for increased vigilance in zealously guarding their profession from the attacks of the outside interests. We believe that the proper position of the agricultural industry cannot be secured until the farmers get together through their own organization and demand the passage of laws that are fair and the election of men to executive positions who are not biased in favor of the selfish interests which prey upon the people who produce.

We believe in improved methods in agriculture and know that the productiveness of our farms should be and must be increased; yet, we also feel that it is not by method that the farmer will come into

his own as a producer and a real part of our social and business scheme, but, by legislation and the proper execution of well meant laws.

Respectfully submitted,

HOWARD G. McGOWAN, Chairman.
A. J. KAHLER,
S. S. BLYHOLDER,
E. B. DORSET.

The CHAIRMAN: You have heard the report of the Committee on Legislation. What action will you take upon it?

MR. BRONG: Mr. Chairman, I move the acceptance and adoption of the report.

The motion was seconded, put and agreed to.

MR. SELSER: Mr. Chairman, may I have the privilege of speaking just a moment? I did not hear any report on the subject of diseases of bees which I presented and which was referred to the Legislative Committee.

MR. McGOWAN: We did not have that material on hand, I am sorry to say. It was not in in a formal way and we overlooked it.

The SECRETARY: Mr. Chairman, I move you that the report be amended by inserting a recommendation to the General Assembly now in session that an act be passed providing some method for the extermination of what is known as "foul brood." If you will accept that as an amendment to the report it is not necessary to report upon it.

MR. McGOWAN: We certainly will do that.

MR. DURNALL: If not too late, may I ask for the re-reading of portion of the report in reference to the minimum salary of teachers of public schools?

The CHAIRMAN: It will be re-read.

Mr. McGowan read as follows: "We further believe that a great help towards the equalization of taxation is found in the proposition of having the State pay the minimum salary of school teachers for the minimum school term."

A Member: I would like the clause read in connection with the telephone question that was raised.

The CHAIRMAN: It will be re-read.

MR. McGOWAN: I am glad to see that you look over these things. That is what we want. We only recommend these things and if they are not the pleasure of the Board we don't want them. We believe they should be in the interest of the whole Board. I will read the clause in reference to telephone companies:

"We would recommend a law compelling telephone companies to interchange messages."

That is a matter that was referred to us. I do not know whether I am prepared to explain the purport of it.

The SECRETARY: I take it that the purpose of that recommendation is that the Legislature shall enact a law providing that the various telephone companies throughout our Commonwealth shall be compelled to exchange with each other. Now here is a local company that is doing business and is very important to the community in which it has been established in keeping up communication with the farmers and with the people of the local ty, and yet certain companies by which they can reach sections beyond the section occupied by their own company refuse to connect with them. If a man has a phone that belongs to a local company and he wants to get away off, a long distance, wants to send a message to Harrisburg or Philadelphia, they won't connect. That is my thought of what is meant by that.

MR. McGOWAN: That covers it.

MR. BLYHOLDER: That is exactly the idea of th's Committee, as an instance of that kind was brought to the attention of the Committee where a company, principally of farmers, in this State with between nine hundred and one thousand phones had been connected with one of the larger companies, and, as we were informed, because certain things did not go just exactly as they wanted—they would not agree to a merger with the larger company—they immediately cut them off and would not forward their messages. Now, you see that is affording them a chance for a monopoly and I feel that it is just and right that a law of that kind be enacted to compel other companies to forward messages from another.

A Member: Mr. Chairman, I would like to say a few words on the telephone business. I am interested a little bit in a talking company as president of a little telephone company. We have a nice little business among ourselves. We try to keep our lines in condition so that the larger companies, the Bell and Independent Company of York State, are very anxious to exchange courtesies with us and do business with us. On the other side of us is another little company that we exchange courtesies with, two mutual companies, and both companies are chartered. I don't want to say that in a braggish way at all, but we take a great deal of pride in trying to keep our company lines and connections and apparatus in good condition and repair so that we can talk through them when the larger companies connect with us or we seek to connect upon their lines they cannot find any particular fault with us. I think the recommendation is all right in one sense. I think that they should be obliged to transfer and transmit our messages from our local lines, but back of that the local companies should be under obligations to keep their apparatus in first class shape. You travel through some of the country up there and you will see some of the lines lying on the ground, and you see their poles tipped, this way and that and cracked, and their apparatus is in a bum shape, to speak plainly. I don't blame any good organization like the Bell Telephone Company or the Independent or York State or any of these Independent Companies for being particular as to how their service is held up by some cheap bum service of some local places. I am satisfied, gentlemen, that there will probably be something done in the

line you speak of because there is a feeling among the rural districts that they should be let out; but, gentlemen, I think there should be something legislated in there to stop a class of persons who take no pride in what they do from infringing upon the man who has some pride in what he does.

The CHAIRMAN: I am glad that has been brought out. I feel as much interested in this question as anything in that report.

MR. GEARHART: My attention has been called to the circumstances which brought about this resolution. The difficulty has arisen in the northwestern part of the State. As I understand it, a local company has organized and built a line. They first connected up with one of our prominent telephone companies of the State, which I don't care to mention, and it was all satisfactory as long as they were the only people connected with it; but later they coupled up with the Bell Company so that they could have service from that company. The other company immediately disconnected and has refused since to transmit messages over their wires. I think that is where it originated, not because of inferior service but because they would not allow the rural company to have service with more than one of the big companies.

The CHAIRMAN: We have a personal experience. There is a demand that we have an outlet greater than our company furnishes and there seems to be a disposition on the part of the two leading lines in our State, the United and the Bell, to furnish this and they are willing to do most anything for us, so they say. But the result is that neither gives us that outlet. They will do nothing for us as long as we stay out and don't let them have the whole control and we don't feel like doing that. I am in accord with what the one gentleman said that there is something due on our part but when we do our part we are not quite ready to be absorbed because we want this local telephone business and we also want an outlet on the general trunk lines; and this, in part, was inserted to get up some enthusiasm and discussion. We don't propose—I am a member of that committee—to outline a law here at all. We only suggest it for your consideration. There is a law on the statute books, if I am not wrongly informed, in regard to the railroads and it is a mooted question whether it don't apply to the telephone lines; at least the attorneys think that if brought into they would have to come in under the same law as railroads.

MR. WELD: Everything works all right so long as we connect with one trunk line, but when we attempt to connect with the two there is trouble. Now it has been suggested that if legislation could be put through and these matters submitted to the Railroad Commission with their powers increased, that such matters might be adjusted amicably and everyone be benefited. It seems to me that would be a good solution of the problem. There are rights on both sides. There are rights for every corporation and company and their business interests that have to be looked after. If a commission that was not personally interested could be a judge in these affairs it seems they may be amicably adjusted and everybody treated right.

MR. WILSON: I would like to have the section of that report read in reference to the lumber business and the use of the public roads.

The CHAIRMAN: The Chair will read it.

"We, your Legislative Committee, would suggest that some remedy be presented, or law enacted to regulate the improper use of our public roads by lumber teams and cutting them up and almost ruining our public roads through heavy hauling over the roads without paying any damages to townships, many times ruining the roads for miles. Permits should be taken out, through the Board of Supervisors, before using the roads for continuous heavy traffic. When a public road is almost entirely ruined, many times to the extent of several hundred dollars, some specific remedy should be prescribed by law."

MR. WILSON: Now in regard to that clause, it has got to be that we have not a monopoly of the lumber business in Pennsylvania. We have to compete with Southern states and other states that have no such a law, and I think that this will almost paralyze the lumber business in the western part of the State. It has got now that the lumber tracts are far distant from the point of shipment. The lumber that is handy to transportation sources is almost all used up. The lumber tract is the highest priced tract generally in the county. It pays the most taxes, and I don't see why we should ask for a law that would discriminate against the lumber business. They pay a high tax.

And another thing: Lumber bills now are almost always cut to specifications and require delivery in certain time. When you give a bid on a bill of lumber and it is accepted there is a specific time to deliver that lumber to the railroad station and if you cannot haul it over the roads I don't know what we are going to do. The lumberman pays as high a tax as any person and I think he should have an equal right to the roads at any time of the year as the farmer or any other citizen of the Commonwealth.

As I said before, we have no monopoly. We have to compete with other States in the price of lumber, and lumber prices have been on the boom for years lately same as anything. I think the lumberman should have equal rights on the public highway with any other party or persons doing business. I think it is working an injustice to the lumber interests of our State if we cannot compete with the other States that do not have this law.

MR. HUTCHISON: I hope that that portion will be stricken out of the report. I don't believe it would have any effect if taken up with the Legislature. I don't think it is constitutional; that a man, because he is hauling lumber on his wagon, cannot haul certain amounts. If it was something to regulate going over the public roads, prohibiting hauling a load beyond a certain weight, then it might pass, but to pick out one industry like that, I don't think it is a good idea. I am not much on legislation but the thought just comes to me that that would not be constitutional at all, and we

should not go on record for such a good report with so many good things in it and have something that would weaken that report like this in it.

We have men in our section who are heavy tax-payers and who have some timber. These men farm in the summer. At this time of the year they are engaged in taking out the timber and hauling to the market where I live and to other points. Why should not these people have the privilege of going on the roads. There is no hauling on the roads like fifty or sixty years ago when six horse teams were hauling for the iron works in certain directions; and we are making a mistake going on record for something not feasible, that will not be considered, and I believe to be unconstitutional for the reasons that I have stated.

MR. MCGOWAN: I don't think that was the thought of the committee at all, to make any discrimination and simply pick out lumber teams alone; but the thought was heavy hauling over a certain weight. I know a case in which the roads were almost entirely ruined possibly for three or four miles in length through heavy hauling, roads that were in direct line to market over certain sections of the county, and the market men were obliged to take another road that would add two or three miles to their distance going to market as these other roads were in such a condition as to be impassible.

MR. HUTCHISON: Could not there be incorporated that no tonnage could be hauled in wagons except those with a tire, say of a certain width?

A Member: There is such a law on the statute books now.

MR. MCGOWAN: It is just this: It seems to me there is no control. For instance, stone men might come in and use a road for two to four miles and tear the foundation up and fall out with the supervisors for not keeping the road in shape, and stay there for a year or more and not even thank the supervisor for the use of these roads and leave them in a position that would be an expense to the township of several hundred dollars. It was the thought of the committee to feel around and see if there was not some way by which these people would have to take out a permit before they could do this heavy hauling, that they would have to get in line with someone in power, and it seems to us that there ought to be a way of taking this up with the Board of Supervisors that they might use a road between two given points and either agree to let the road remain in the condition in which it was before or get permission at least of this Board in some way. I know the townships have greatly suffered and sustained losses by heavy traffic.

MR. BARNES: I live in a section where we have one of the longest stretches of State road in Pennsylvania, a distance of about ten miles, and we don't have much trouble in going on that road as long as our people continue to haul heavy loads on broad tired wagons. I think it would be a good move to compel the citizens of this Commonwealth to haul on tires not less than four inches broad any amount over two tons. It would be one of the easiest ways to keep the public highways of this State in better condition. A tire

four inches or over that is almost equal to a road roller where used continuously, one wagon following another as around lumber camps and where there are industries of that kind in existence.

MR. DURNALL: This is a subject that is covered in a measure by reciprocity, as I travel over your district and you travel over my district. That is the way we usually propose to solve the problem. But I happen to be one of the number that are sufferers in our district from the fact that there are manufacturing works established just over about one hundred or two hundred yards in another district, where they don't contribute one cent of taxation toward the support of our public roads and streets; and yet there are as many as half a dozen different teams from this one establishment of two to four horses, with from one and one-half to three tons on a load, with a three-inch tread wagon, traveling over the road every day in the year, cutting and rutting these roads that are thoroughly improved at great expense; and yet they don't contribute one dollar and we cannot reach them. That is just what we want to cover. Any other travel we are interdependent, one township upon another, one county upon another, one state upon another; but it seems to me there should be some relief in cases that are extreme, when the persons are reaping all the advantage and all the accommodation and does not have to accept one cent of responsibility.

The CHAIRMAN: I would like to have an expression. We may carry it too far.

MR. BLYHOLDER: It is only to create sentiment and I think it is worthy of some thought. I think we are getting information now that we want and I think the committee is getting exactly what they desire. It seems to me now that instead of naming any particular class of teamsters we make it general. Now in the township in which I live, I want to say in reply to what the gentleman to the right said that a four-inch tire is very well so far as it goes, but in my township in the past summer they used twelve-inch tires and broke down nearly every bridge but one, and they used ten teams of horses in one wagon. It is extreme cases and cases of that kind that we ought to provide for, hauling as much as twenty to twenty-two tons upon one wagon. Now, pretty nearly all the bridges on the road were broken down. Of course, where there were large bridges and in danger of going down and losing they would brace them up; but the small bridges were all broken down on these roads. It is in such extreme cases that we want relief. By the way, the corporation that did that hauling does not pay one cent of the road taxes in any district. They have a plant in the district that is worth two hundred thousand dollars but we cannot get one cent of tax from it. So I think that it is in such cases as that that the committee has made this recommendation.

MR. MCGOWAN: We have had a like experience in our county. The loads required as many as fifteen teams to haul them and they hauled during the Fall when the roads were soft and sometimes they started with fifteen teams and would have to get others on the way to help and there is not a run bridge but what is broken down. Of course they have fixed them up temporarily. But I think there ought to be a way by which they could be reached, but not pick out the lumber team alone.

MR. ESCHBACH: My solution is to make the roads better and make the bridges strong enough to carry whatever is to go over.

The CHAIRMAN: What is the pleasure of the Board in regard to this section?

MR. McGOWAN: Mr. Chairman: We might make an amendment to that, to strike out the word "lumber" and make it apply to all heavy team hauling.

A Member: I offer an amendment to that effect; that the word "lumber" be stricken out.

The question was put and the amendment agreed to.

MR. WILSON: Mr. Chairman: There is a reference to the game question that was brought up here. There is not much said about it, but districts out our way are interested in it and I would like to have that read.

MR. McGOWAN: That section reads as follows:

"We disapprove of a law which inflicts a license fee for hunting game throughout the State."

MR. WILSON: I am much in favor of this license bill. This is a license for the whole open season; and then in the Spring of the year when the woodcock season is in and groundhogs. A man who cannot pay one dollar for that much sport during the season should not own a gun, and the miners and workmen want this sport. In our section it is the fellows that don't work much who roam around and the less they work the more dogs they have.

MR. GEARHART: Mr. Chairman, I rise to a point of order: There is nothing before the body but the adoption of the motion as amended.

The SECRETARY: The point of order is not well taken. It is the report that is before us and we are amending the report, taking it up seriatim and amending the report and after we are through with whatever amendments are to be made the report will be adopted as a whole.

MR. GEARHART: I don't think you understand the situation. The amendment was to strike out the word "lumber" and the amendment was adopted but the section as amended was not adopted.

The CHAIRMAN: All those in favor of the adoption of the section as amended will so signify.

The SECRETARY: Are you adopting the report now?

The CHAIRMAN: Just the section as amended by striking out the word "lumber" and making no discrimination, simply letting it apply to all heavy hauling.

The SECRETARY: My understanding is that that will be an amendment to the report. The report says "to regulate the improper use of our public roads by lumber teams cutting them up and almost ruining them by heavy hauling. The amendment is to strike out the word "lumber" and substitute all heavy hauling. That is

an amendment to the report. Now my understanding is that it is our province to go through the report and make such amendments as necessary, and after the report is properly amended then adopt the report as a whole. Perhaps I have not heard all that is going on here and may be mixed as to the form in which the motion was made.

MR. MCGOWAN: This is the only amendment made so far and if we adopt that then we are ready to adopt it as a whole.

The CHAIRMAN: We are now voting on this clause as amended.

The question being put, the section was adopted as amended.

The CHAIRMAN: We will now vote on the adoption of the report as a whole.

The question being put, the report was adopted as a whole.

The SECRETARY: Now, Mr. Chairman, I want to inquire whether it is thought to be the duty of the Committee to do what it can for securing this legislation. My understanding of the duty of the Legislative Committee is not so much to propose legislation as to endeavor to see that it is carried out, and in order that we may have an understanding as to what the Committee is to do, I move you that the Committee be instructed to use their best efforts to secure the legislation they recommend.

MR. BLYHOLDER: We are very thankful for that motion for the confidence reposed in us; but I want to say to you that the Committee is to recommend. You have adopted the recommendations of the Committee and it is your work to see that it is carried out. We will do all we can.

MR. MCGOWAN: I can readily see why Mr. Blyholder talks that way. He was anxious to go to the banquet and he stayed only a few minutes. He said: "You go on with the work of this report." We adjourned at eleven o'clock and he had not returned.

The CHAIRMAN: I had the honor of being on that committee for a number of years. I have done as much as I could do. I have spent four or five days to see some measures enacted into law, and I think this committee will do everything in reason to see it is enacted into law.

We have one more item on the program, "Tile Drainage," by Mr. T. E. Martin, of West Rush, N. Y.

Mr. Martin then delivered his address as follows:

TILE DRAINAGE

By T. E. MARTIN, *Syracuse, N. Y.*

We are realizing more and more every day that tile drainage is a very important factor in the successful pursuit of agriculture, and there is no doubt that where tile drainage is needed and is done it will soon repay more than its cost. Some people try to improve their farms in other ways. They will erect good buildings or in some

way improve the farm. That is all well in its place, but just remember that buildings will not make a farm but a farm may make buildings, and if the soil is wet it will pay to drain it. Many dollars are spent for fertilizers and I know that if such money was spent in buying tile and putting them into the ground it would have paid much better. We are constantly looking for paying investments. Tile drainage is one way to invest money in such a way that it will pay sure and large dividends annually without the aid of an investment company watering the stock. Tiles abhor water.

I would just like to take up the soil for a few minutes. Soils are made up of innumerable small particles. These vary in size and shape and touch each other, more or less, according to the compactness of the soil. It is said by scientific men that soil particles vary in size from 4-100 of an inch to 2-10000 of an inch in diameter. (Blackboard illustrations used throughout.) If a soil is made up of very small particles there are more particles in a given quantity of soil, and of course, we have consequently more soil spaces. The smaller the soil spaces, the closer the particles lie together and the more resistance offered drainage and consequently more drought resisting. The coarser the soil particles the less resistance offered drainage and drought. Therefore, the soil is made up of spaces largely. These spaces are said to range from thirty-seven per cent. in coarse soils to sixty-five per cent. in fine soils. If we have fine soil particles we have more space in the soil and vice versa with coarse soils. Now these spaces in the soil perform several offices, three important ones. They provide for the drainage and removal of the water from the soil and aeration. Also, they provide for capillary attraction to be re-established—a triple mission being performed. Here is the surface of the soil. Rains come and the soil is thoroughly saturated with water. If the soil is coarse or fine, the water table gradually lowers accordingly if an outlet is provided. Here is one tile drain and here is another over there. As the soil is saturated with water, it commences to pass off through the drains. The water table in the soil gradually lowers slower and slower until it gets near the grade line. The water directly over and around each drain is the first to flow away to the depth of the drainage system. If drains are placed three feet deep, they would not drain to that depth over here, midway, probably only two and a half feet deep. If we place the drainage system three feet deep we do not drain all the land to that depth but perhaps around two and a half feet. Something must be allowed for the flow of the water through the soil. Now as the water goes down and out we can see how effectually the drains work. It will dry up wet stagnant soil so that it will grow any ordinary crop. I want to clear up one point. As the water goes down—just remember it is only the surplus and free water that the tile drainage system removes from the soil. As the water goes to the drains, each small soil particle retains a little bit as film moisture. This amount of film water ranges from fifteen to twenty per cent. of all the water a soil will hold. This soil above the water table—the drain level, has retained by surface tension all the moisture it needs. As the water lowers down to this drain level the excess water flows away by gravity off through the drains and capillary attraction being re-established brings the water from below this level up towards the surface. Drainage does not interfere with the sub-soil water below

the drains. We have just as much water below the drains as we ever had whether soil is drained or undrained. Capillary attraction brings up the sub-soil water from unbelievable depths. The finer the soil particles, the smaller the spaces which form tiny like hair tubes throughout the soil. They form channels, vertically, horizontally and diagonally in every direction. Now capillary attraction is the force which brings the water from lower to higher levels just as soil rises in and by the lamp wick to the flame. The water passes out of the soil by and through these same channels according to gravitation along the lines of least resistance. Water leaves the soil in obedience to the laws of gravitation. Drains have no magical power to draw or extract water from the soil. A cubic foot of water weighs $62\frac{1}{2}$ lbs., and it is easy to see how water is compelled drainward. Here is a cubic foot of water weighing $62\frac{1}{2}$ lbs., and another right here on top of same. It is easy to figure out the pressure on each 144 square inches of area. But the soil sort of dams up, stops, holds back the flow of water through the soil, so we do not get the full pressure. Here is a side view of the tile drain. The soil spaces nearest the tile joints are the first ones to flow into the tile. Next, the excess water from the soil flows into the empty spaces, then into the tile drain at the joints and not through the walls. The bulk of the water goes in a drain that way at the tile joints. It is too slow a process for it to ooze through the walls of the tile. Then the soil spaces nearest those emptied are the next to flow drainward. This flow of excess water drainward continues upward and laterally until an equilibrium is established throughout the soil. That is the way a tile drain relieves the soil of excess water.

Tile drainage is a permanent paying investment. I will now try to show you how we applied it. We had to do a good deal of drainage work upon our farm to get it in shape. We started in 1894 and we have 10 1-5 miles (3265 rods) on 57.85 acres of land. It has paid us many times over the cost—\$2,500. In the year 1908 our potato sales from 18 acres reached \$2,807.89, and the drainage system more than paid for itself that one year. Four tons of cured clover and forty-five bushels of wheat per acre are the other best yields. Right here at my left (indicating on blue print) was a large pond and here an open ditch and natural stream. It leaves our place at this point and goes across a neighbor's farm. All this work was done at our own expense and the distance 3750 feet. The work on this neighboring farm has cost several hundred dollars. That shows how we value tile drains. Not only this, but we have to annually clean this out at an expense ranging from \$10.00 to \$50.00. The fall is slight and consequently the water flowing there deposits sediment which must be shoveled out later.

A Member: I would like to know if your neighbor objected to your building a drain across his land?

MR. MARTIN: No; in New York state we had an old law, now amended. The law now is such that a man can go across a neighbor's farm, but if there is any damage, he is liable; but ordinarily there is no damage unless a new channel is opened or crops destroyed.

A Member: But if you do not change the regular channel of drainage he cannot hinder you any?

MR. MARTIN: No; you have the right to go on or over his property. That is the law in New York state. You can go on to another man's farm to deepen or widen or lower the depth of a natural stream. You can go down with reasonable depth and if he will not allow you to do so you can take proper steps to compel the establishment of your rights.

This is a map of our farm at West Rush (indicating). At the present time I am living in Syracuse. The top of the map is north and the right hand is east, the left hand is west and the bottom south. This represents 57.85 acres. This is the north line and the south line is right along here. The farm is rectangular. Here is a large open ditch. Here is the 3750 feet of draining that we just discussed, starts here and flows southwesterly. This is an eight inch sewer pipe main and the sub-mains and laterals flow into it. Here are intakes. Every one of these mains, sub-mains and laterals are numbered or lettered and all are indexed.

A Member: How large are the laterals?

MR. MARTIN: Three inches; all round tile. I would not recommend anything less. Where the grade is heavy and the soil is firm, smaller tile will carry the water, but often in certain soils, areation of the land is as essential as removal of surplus water.

A Member: How far apart do you put your lateral drains?

MR. MARTIN: In our soil fifty-five feet apart. In some places we have a tight sub-soil. This is very important to know about, previous to laying out a drain system. I would work it up and I would keep track of it; keep account of the work daily so it can be accurately mapped out as the work progresses. I would use four inch pipe here for the reason that it gives greater and better areation and drainage to the soil. There is as much improvement to some soils by areation from tile drainage as we get from the mere removal of surplus water by the fifteen pound atmospheric pressure which forces air into the soil. As the water goes out, the air will go in if there is not an excess of water in the soil. Just opening up with tile will benefit it greatly, but not as much as by the removal of surplus water from a wet soil. Drainage warms and areates a soil while drying it. Now in laying out a drainage system, while there are many ways to do this there is one important point that should always be considered and that is to adapt the system to the land and not the land to the system.

A Member: How far apart do you leave these tile? You do not have the tile close up?

MR. MARTIN: We want the tile jointed close, just as close together as we can. We do not want them apart at all nor any open spaces or poor joints on upper side of tile line. Of course, such close jointing is not so important in firm soil. We join them as tight as practicable in quick-sandy and treacherous soil. The office of a tile drain is to remove the excess water from the soil. Just as soon as the soil particles commence getting into the tile drain with water there is dirt getting in and if the flow is slow and the grade light—not good, there is grave danger of the sediment lodging,

especially at the low places. Here is the grade. If there are little low places all the sediment going down the drain is going to lodge there. The water flows through tile drains under no different conditions than on the surface, along the lines of least resistance. If the fall is slight and the flow slow of course it is only a question of time before the system will fill up and become inoperative. Be careful about that. I want the tile jointed as close as I can get them. If there is a little opening down here on the under side or at the bottom I am not worried about that, but if there is an opening on top I pack it with clay or put a flat stone over it. If the water flows straight direct into the tile from the top it will take soil with it, but if in at the side or bottom, it oozes up and will not take soil with it, even if there is a little sediment in the surplus water entering a drain from the bottom and water flowing through same, it will doubtless be washed to the outlet.

A Member: How deep do you dig the ditch?

MR. MARTIN: About four feet deep. I am a firm believer in deep drainage. I do not say that is the proper depth. I do not know the conditions in Pennsylvania. The time is coming when alfalfa is going to be largely grown in my own state, New York, and here too I hope so and believe it will.

The SECRETARY: There is plenty of it growing in this state now.

MR. MARTIN: It is coming. The deeper down the drains are placed the less the roots are going to interfere with the drainage systems. Where there is water constantly flowing through the drains there is an inducement for the clover or alfalfa roots to enter the tile in drouthy periods. For instance, here is a spring flowing continuously through the year and here is a tile drain flowing from it. Here is the surface of the ground. If water is needed during a dry time the roots of the clover and alfalfa will have a tendency to get into it. But the deeper the drains are laid the less trouble we are likely to have from the alfalfa roots.

LAYING OUT SYSTEM

Suppose we had a rectangular field and wanted to drain it. If a valley passed down the centre of that and the slope of ground was at right angles to the valley. The proper way to drain it would be to put the main through there, the lowest places, and the laterals placed at right angles—straight up the slope. Or if the field had a slope, say angling to this low place down through the centre, the side drains ought to be placed like that at an angle of 45 degrees. (Illustrated on blackboard.) That would be the proper way to lay out the system. Run the drain straight up and down the slope, so each lateral takes water equally from either side. Drains running diagonally up a hillside take water principally from the upper side—an intercepting drain—half a drain giving only 50 per cent. efficiency where 100 per cent. is obtainable. Good drainage consists of parallel drains of good length and depth and so placed that the drainage reaches laterally from drain to drain and on time.

A Member: Suppose out there thirty rods from that main there was a pool of water or a pond, how would you drain that pond?

MR. MARTIN: If the pool or pond was not too deep and soil firm I would run the drain right into and through the centre of it. If too deep with soft bottom, I would curve around it, each side with a lateral keeping drain in solid ground. Test firmness of soil with a steel rod. Later, perhaps one year, the soft ground will become firm. Then a central lateral could be put in.

A Member: Do you think one drain in the centre of a pond of one-half to three-quarters of an acre would be sufficient?

MR. MARTIN: No. If I had a pond like that to drain, I would try to run one main through here and when I got up here branch out like that each side parallel, 40-50 feet distant. Or, if the pond extended that way, put one or more laterals out that way. There are various ways it could be done. I would do it thorough with as few lineal feet of drain as possible.

MR. STOUT: Are you operating in the glacial district in New York?

MR. MARTIN: Yes; it is practically all glacial there.

MR. STOUT: What is the nature of the sub-soil?

MR. MARTIN: Soil is Dunkirk series with sub-soil generally of stony hard pan, clayey nature.

MR. STOUT: Clay?

MR. MARTIN: No; clay under part of it.

A Member: How do you get down four feet?

MR. MARTIN: Open up with a plow and finish with pick, shovel and modern drain tools. Try to do draining in the Spring when the ground is soft. Here is one problem. In other words, try to adapt the drainage system to the land and not the land to the system as I emphasized before. There are many drainage plans and they look nice on paper and each has its merit but it is a mistake to apply any one drainage system to all conditions because they will not work out well. Where the land lays in that direction or 45 degrees, angling to the main, that would be a proper way of laying out such a system but not recommended only for conditions of this kind. It requires more drain to drain an acre of land on that plan than the right angle plan. For instance, this main going down through there, that ground—60 feet wide strip—is double drained, where laterals cross it. Say the main draws thirty feet on this side and thirty feet on the opposite side with side laterals crossing same. This area has double drainage; avoid that. Here would be a little better system, running the laterals out at right angles. For this reason that while we have some double drainage here, we do not have so many feet of tile because the laterals run at right angles. There is a better system yet. If we have a square or rectangular field and the slope of the land be to the lower side of it, I would run a main up and out like that and put the laterals out this way—at right angles to main. If drains are placed sixty feet apart I would place this main thirty feet

from the side or end of field and laterals at sixty foot intervals. This main would draw to the side or end of field and there would only be this little double drainage area down here on one side.

This is the ideal way where it can be applied, but unfortunately it can not be applied only in a few instances. It could be applied to a field of five, ten acres or a large farm or tract of land, if the slope be that way and then down to this corner; or, it was not down to this corner and the lowest place was here it should be placed thus. That is the ideal way of laying it out. If the farm is rectangular it is easier to lay out and map up and easier to find these drains later on. For instance, if you put in every other drain this year, when this is laid, put in the branches at the proper places. Put in 3 or 4 by 6 "Y" branches for laterals in the 6 inch main drain and note their distances sixty feet from each intersection, and keep a map of the work daily. To facilitate future location of such lateral branches a short stake should be placed upright on main, at branch intersection, leaning against lateral side of branch and extending to within 12 inches of surface—below the plow point and dead furrows. This saves the labor of digging down to the main and branch. It is easier to find and put in the remaining lateral drains of the system. When you want to find lateral branches you have something to go by.

A Member: Through an area of quicksand do you advise putting planks under your tile?

MR. MARTIN: No; I would not put any plank or board under tile under any consideration if I could avoid doing so. Simply because here is an inch board under the tile. Usually cheap lumber is purchased for such work. In some sections it costs as much as the tile. And here is the danger. One board might last sixty years; another board might last some hundred years; and another board last longer or shorter. If the fall is *slight* these boards rotting down or out at different times will let the tile down accordingly. It is only a question of time until the drain fills up. At a large meeting recently, we had a discussion over it and one man told about using cement instead of boards in these soft places. I think it is an excellent plan. This is a wise way of avoiding future trouble in these quicksand places. Tile drainage should be a permanent improvement, returning annually and eternally large profits. Therefore the work and material used in construction should be enduring—a heritage to posterity more valuable the 100th year than the first. I would try to do this work through quicksand and springy places during the dry time of July, August or September when there is not so much water in the ground. For small springs, wet spots or tenacious clay that holds back the excess water, one foot in depth of coarse gravel, cinders or any suitable material of a permanent nature should be put on tile. This increases many times the rapid absorptive capacity of a drain. In our work we used horses and plows for the opening and closing work and hand tools for the remainder. The drainage cost us \$2,500.00, but we could not do that now because tile and labor are higher. We lay out our drains by setting a row of small stakes a foot long so that the plowman can easily see them—and when we are ready for the plowing one light furrow is run right down over the line where we want the drain to go, following the little stakes and a man ahead of the three horse team pulling them as he goes.

If the plowman plowed deep the first furrow, he could not hold up stakes on the return—opening a dead furrow over the line of the drain. Next we strike out a back furrow in the dead furrow and shovel out, replot lengthing hitch by chain and reshovel out the loose dirt. We can open ditch about $1\frac{1}{2}$ to $2\frac{1}{2}$ feet deep, sometimes more and sometimes not so deep. The ditch will necessarily be wider with more soil to handle, than where the ditch is all hand dug but horse work lessens cost materially. The top soil is put on one side and the drain and sub-soil on the opposite bank and filled accordingly. Usually the drains are opened in pairs for this reason: The top soil is placed on the right bank and the sub-soil of the next parallel drain is placed on reverse banks to facilitate in plowing in the drains by going up one bank and down the other. The only carrying of the furrow we have is across the ends.

A Member: In regard to boards decaying under the ground, is there any truth in the theory that boards constantly wet will not decay?

MR. MARTIN: Yes, I am sure that the time will come when they will rot out. I would not put anything in or under the drain system that would in any way decay or cause trouble in the future. As sweet memories of good work linger long after the cost has been forgotten it is highly important that only the best thought, labor and material be used. Especially be careful about everything that goes into the drainage system and make it as permanent as you possibly can.

A Member: In a case where a drain has to take in surface water at the end near your neighbor's fence where the washings and water accumulates, how would you get the water in the end?

MR. MARTIN: To take in the surplus water. We ran the drain up like that; nearly to the top of the ground. Here is the drain. Right at the mouth of it we dig out what we call a silt basin $1\frac{1}{2}$ to $1\frac{1}{2}$ feet below the mouth level. It is important to make the basin large enough to hold all the down coming mud. The mud lodges in the basin which is later cleaned out. Mud going in will cause trouble. We have special screen pipe at all intakes and outlets. We had considerable difficulty in getting them at first but not now. Such special pipe can be made by any sewer pipe factory. One-half holes are punched in the pipe while it is green and before burning. Let that represent an eight inch sewer pipe. That circle is the end of it. The holes are punched right there for four vertical 3-8 inch iron rods; 1 5-8 inch from centre to centre punched through the pipe, two inches back from the edge. Rods have an L hook on the upper end and they keep out muskrats, refuse, leaves, trash, etc. Each inlet, outlet (we have just one outlet and I would not have more than that if practicable) and special pipe is provided with these rods. Also these special pipe are set in a cement abutment. This cement abutment is valuable in several ways. It maintains the elevation of the drain, and stability of the bank which is not caving off from undermining by either animals or the elements, causing the outer pipe from getting down and filled up.

MR. KERRICK: Mr. Chairman, the Committee on Resolutions is now ready to report.

The CHAIRMAN: We will have the report read.

MR. KERRICK: Mr. Chairman, I will ask my friend, Mr. Joel Herr, to read the report.

MR. JOEL HERR: I want to say that some of these resolutions were submitted at a late hour and we had no time to prepare and typewrite our report. Some of the resolutions were presented to us and some are of our own manufacture.

Mr. Herr then read the report of the Committee on Resolutions as follows:

REPORT OF THE COMMITTEE ON RESOLUTIONS

To the Pennsylvania State Board of Agriculture:

We your Committee on Resolutions beg leave to offer the following report. We have studied the Resolutions submitted to us and report the following as meeting our approval:

RESOLVED, That we recommend to the General Assembly of our State, now in session, the passage of an act providing that fertilizer manufacturers shall, in placing their guaranteed analysis upon the packages containing their goods, make no statement of equivalents or any other matter than the simple statement now required by law.

Appreciating the valuable services of Mr. H. J. Wilder of the Bureau of Soils of the National Department of Agriculture, we would respectively urge the Federal Department of Agriculture to continue his services in Pennsylvania as we believe the time is ripe for great activity along the lines of soil investigation and its application to our various agricultural interests.

We would further ask that provisions be made for the further development of the fruit industry of the State as conducted by Prof. J. P. Stewart of State College.

We recommend for the Department of Agriculture such increased support from the State as the increasing work demands for its successful prosecution.

We heartily indorse the movement to establish in our State an Agricultural Fair worthy of our Commonwealth.

We recommend that the expenses of the meetings of this State Board of Agriculture be provided for as usual.

We appreciate the work of the Department of Economic Zoologist and recommend a liberal provision for the prosecution of its work.

We are in hearty accord with the movement to improve our public roads. We believe that State Roads should be built and kept in repair by the State, and that liberal provision be made to improve our Township roads.

Recognizing the great work of the Pennsylvania State College School of Agriculture and its greatly increased needs on account of the wonderful increase in the number of students, we most respectfully ask that appropriations be made for its support commensurate with its needs.

WHEREAS we believe that there never was a time in the history of our Commonwealth in which the importance of extended knowledge relating to successful agriculture was so fully realized as is the case at the present time, and Whereas, the prosperity of our State depends more upon the development of its agriculture than upon any other industry in which her people are engaged, therefore,

RESOLVED, That we recommend to the General Assembly now in session, an appropriation to the Department of Agriculture of one hundred and fifty thousand dollars, for the two years beginning June 1, 1911, to be devoted to demonstration and agricultural work, as the Secretary of Agriculture shall direct.

WHEREAS this Board, in the discharge of its official duty is brought into close touch with the Department of Agriculture, so as to be able to judge of the efficiency of the efforts put forth for advancing the agricultural interests of the Commonwealth and the enforcement of the laws enacted to secure this end

WHEREAS, we regard a proper administration of the affairs of the Department of inestimable value to the farmers of the State, and

WHEREAS, we regard the Farmers' Institute as occupying a very important place among the educational agencies employed for the advancement of Agriculture, therefore, be it

RESOLVED, That we take pleasure in recording our appreciation of the valuable services rendered to the Commonwealth by the present Secretary of Agriculture and his efficient Deputy who has charge of the Institute work, and believing that the best interests of Agriculture would be subserved by the continuance of their administration, we would respectfully recommend their reappointment to the places they now occupy.

F. D. KERRICK, Chairman.
S. SHAFFER,
J. A. HERR.

MR. WELD: Mr. Chairman, I move the adoption of the report as read.

MR. DURNALL: In regard to the resolution on fertilizer, I think in connection with that they should be required to put on their fertilizer bags from what source these different ingredients are de-

rived. Now we are told that nitrogen is derived from some cheap sources and is not then very available and that the chemist is kept busy to detect the source, and I believe it is an important matter that they should state from what source the nitrogen and phosphoric acid is derived.

The SECRETARY: Mr. Chairman, with regard to the matter raised by the gentleman here I wish to say, before retiring from the room before you enter upon the discussion of that last resolution, that we had a bill of that kind before the last General Assembly, and fertilizer manufacturers all over the country, men in whose word I have confidence because I believe there are honest men among the manufacturers of fertilizers, say that if that measure would become a part of the fertilizer law it would increase the price of fertilizer very largely. They say sometimes when they come up to the point of mixing a certain amount of fertilizer they want to put on the market and they have a large order for a number of carloads to be shipped at a certain time and they don't have perhaps as much nitrate of soda or as much dried blood as would be required in compounding this great lot of fertilizer which must be put on the market and for which they have an order, it is necessary for them sometimes to change from one thing to another. Sometimes they may have an order, as you know if you have been compounding fertilizers, in which they use nitrate of soda as the source of their nitrogen, they will have an order that must be filled promptly and they do not have the nitrate of soda and so they must take the dried blood or take tankage, get the nitrogen from some other source, and they claimed, in talking the matter over with the Committee that had the bill under consideration, that it would largely increase the price. I wanted you to know that fact before you acted upon the matter suggested by the gentleman here.

MR. JOEL HERR: Doesn't the law almost cover that which is in existence now. Nitrogen derived from certain sources will have to be specified, if leather scraps or wool waste?

The SECRETARY: If derived from leather, hairs or wool waste, or any of these insoluble materials are used, it must be stated.

The CHAIRMAN: I am glad that has been brought out before the Board.

The SECRETARY: Mr. Chairman, before you act upon that last resolution I hope Mr. Rodgers will take his seat as Secretary pro tem.

Mr. Rodgers thereupon took his seat as Secretary pro tem.

The question on the adoption of the report being put, it was agreed to.

The CHAIRMAN: Is there anything further to be brought before the Board? If not, we are ready to adjourn.

MR. HUTCHISON: Mr. Chairman, I move we do now adjourn, to meet at the call of the Secretary at the time chosen by the Deputy Secretary for the Round-up Meeting of the Farmers' Institute and Lecturers, at Lancaster, Pa.

MR. DURNALL: Mr. Chairman, I second the motion.

The motion was put and carried.

Whereupon adjourned finally.

A handwritten signature in cursive script, reading "A. B. Crutchfield". The signature is written in dark ink and is positioned above the printed word "Secretary".

Secretary.

Commonwealth of Pennsylvania.

DEPARTMENT OF AGRICULTURE

BULLETIN No. 197

PROCEEDINGS OF THE
FARMERS'
Annual Normal Institute

AND SPRING MEETING

State Board of Agriculture

COMPILED BY

A. L. MARTIN, DIRECTOR OF INSTITUTES



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